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"Areagrams" of Open-Hearth Furnace Flues

How the Plotting of the Passage Areas Conducting Gas and Air Revealed Defects in Design and Construction—The Soaking Pit

BY A. R. MITCHELL

Having had an opportunity to study the design of the ports, uptakes and valve areas of numerous open-hearth furnaces in the past six years, I decided to construct a chart, which I have termed "areagram," for the purpose of more vividly inspecting the areas of both the gas and air passages.

In order to show the usefulness of the areagram, as a means of placing before the designer the areas of the passages on a small and compact chart, I will take for an example an 85-ton furnace which was constructed for a steel plant in the middle west. This furnace was built by a contractor, and very little attention was given to the details by the purchaser, as he thought the furnace one of modern design, and the designer one with considerable experience.

The furnace had two gas ports and one air port. The gas ports were of the water-cooled type, made under the Knox patents. The furnace was capable of handling a charge of 185,000 lb. and, being an entirely new one, with water-cooling facilities, it was naturally anticipated that the melting time would be much less than on the old furnaces in the plant. The furnace was lighted and the usual time taken to prepare the bottom. It was then charged.

Contrary to anticipations the relative melting time was not shortened, but lengthened. This furnace being the only one of five in the plant with the ports and bulkheads equipped with water-cooling devices, the difficulty was at once attributed to this fact. The port coolers being of considerable size, and containing quite a quantity of water, it was thought that the gas in passing through the cooler was cooled to such an extent as to produce the effect of lengthening the melting time. To remedy the difficulty the port coolers were removed, and the furnace tried without them, but this produced no change whatever.

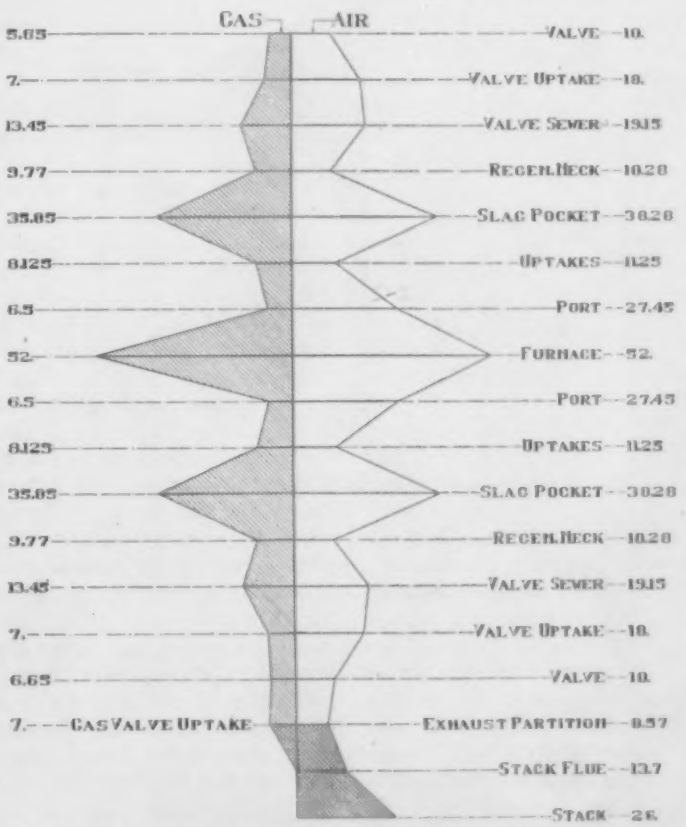


Fig. 1—Areagram Showing Areas of the Gas and Air Passages of a New Open-Hearth Furnace, Starting at the Valves and Continuing to the Stack

The gas producers for this furnace being at a considerable distance from the boiler house it was thought that the steam upon arriving at the producers through the long system of piping, was subject to a considerable degree of condensation. To remedy this a superheater was installed near the producers to furnish thoroughly dry steam to the blower nozzles, but this proved to be an expense, and not a remedy.

The writer, at this juncture, began to study the areas of the gas and air passages, and for this purpose a chart was made, which has been termed an "areagram." On this the areas of the different passages are represented by straight lines. For an example—an area of 4 sq. ft. will be represented by a line four units in length, of any desired scale. The areagram, Fig. 1, represents the areas of the gas and air passages of the new furnace, starting at the valves and continuing to the stack. The gas passages are indicated by the single section lines, the air passages by that part not section lined, and the passages which carry the combined discharged gases from the exhaust ports of the air and gas reversing

valves, to the stack, are indicated by the double section lines.

THE MEANING OF THE FIRST AREAGRAM

A study of the areagram, Fig. 1, will disclose that the passages were constricted or enlarged, as the case may be, without any reason or forethought. For instance, if one looks at the line representing the area at the point (exhaust partition) where the exhaust gases from the air valve combine with those of the gas valve, it will be seen that the passage has been made so small that it has a choking effect upon the air valve exhaust, which in turn limits the amount of waste gases that pass down the air uptakes of the furnace, and through the air regenerator chamber. Consequently the air checkers do not receive the requisite amount of heat in the interval between the valve reversals, and as a consequence the cold air passing through the regenerator does not receive sufficient heat units to raise the calorific value of the combustion over the hearth.

The reader will now note the difference in the areas of the stack and the stack flue, the stack having an area almost twice that of the stack flue. It should be the intention of the furnace designer to have the area of the stack flue as large as that of the stack, so that the furnace, when new, can be operated with the stack damper partly closed, and as the checker work becomes older, and more or less choked with dust and soot, the damper can be raised and some compensation made for the poor draught.

The area corresponding to the line marked (exhaust partition) on the areagram, Fig. 1, was made larger, the water cooled ports were reinstalled. The furnace then made excellent time. The decrease in the melting time of this furnace, after making the opening larger in the partition wall of the valve foundation, may be attributed to the fact that the larger opening allowed more of the waste gases to escape through the air valve, thus permitting more of the burned gases in the furnace proper to pass down the air uptakes, and through the air regenerator chamber, raising the checker work to a higher temperature, and consequently preheating the incoming air to a higher temperature and increasing the calorific value of the flames over the bath.

THE USE OF DAMPERS

It might be suggested by way of an improvement in open-hearth furnace design, that the opening in the exhaust port partition wall of the valve foundation be made amply large, and be provided with a damper such as is used in the stack flue. This would enable the furnace operator to govern the flow of waste gases through the air checkers and allow more flexibility of control.

There is another instance where a damper in the partition wall of the valve foundation might be of value. I have in mind a 50-ton furnace of the single port type. This furnace was capable of making excellent time, had it not been for a tendency to burn the roof in a short time. The flames seemed to start from the face of the ports in a correct manner, but as they neared the center of the furnace, seemed to rise very rapidly, and most of the burned gases passed through the air uptakes, illustrating that the air passages had a much better draught than the gas passages. It might be safe to say that a damper in the exhaust of the air valve, capable of throttling the discharging gases from the air regenerator would pass more of the burned gases through the gas port, and have a tendency to keep the flames from impinging against the roof.

The author merely cites the incidents pertaining to unsuccessful attempts to remedy the defects in the open-hearth furnace to portray the importance of the areagram as a means of looking for the discrepancies in the proportionment of the various flues, also the importance of the areagram as a record in condensed form of open-hearth and other types of furnaces.

The areagram, Fig. 2, represents a soaking pit which was designed by rule of thumb rather than by any forethought. The pit is equipped with two gas valves and one air valve. The gas valves are of the ordinary mushroom type and non-reversing. Consequently the gas control for each end of the pit is separate. The air valve is one of the butterfly reversing type; thus the air valve supplies air to each end of the pit alternately, and is supposed to direct the entire volume of exhaust gases to the stack. One look at the areagram of this soaking pit is sufficient for the reader to determine that the air valve is entirely too small to accomplish what is required of it. It is certainly not conducive to successful operation for the valve to have an area only one-fourth as large as the stack, and expect it to handle the same volume of gases the stack is capable of handling.

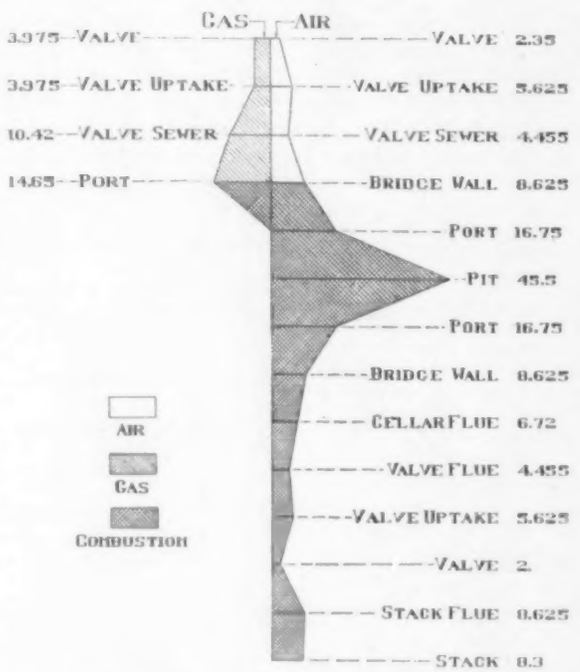


Fig. 2—Areagram of the Flues of a Soaking Pit

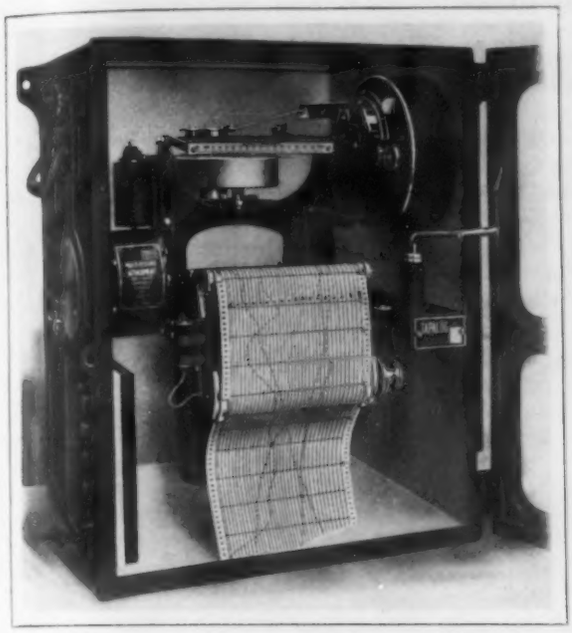
It should be the purpose of the designer to have the reversing valves too large rather than too small, in order that they will act as reversing valves, and not as obstructions in the passages. When the air valve is made amply large, and is not an obstruction, the process of obstructing or removing obstructions from the passages can be left to the operator, and accomplished by means of dampers placed in a suitable location.

Payroll Calculating Chart

A payroll chart for quickly figuring wages has been developed by S. C. Carpenter, 48 Oakland terrace, Hartford, Conn. By means of a disk the elapsed time from starting time to quitting time is obtained directly, in hours and minutes. The total wages corresponding is obtained from radial lines of figures for wage rates of 10 cents an hour up to $1.54 an hour. In short, the chart gives total wages for any number of hours from 1 to 9 inclusive, and for 1, 5, 10, 15, 30 and 45 min., for each rate of wages.

New Autographic Temperature Recorder

An autographic instrument for recording temperatures, operating in a different way from those now on the market, has been developed by the Wilson-Maeulen Company, 1 East Forty-second street, New York City. The principal points of difference are that the record is made on the underside of a paper slip, these records being available in one or more colors, if desired, and the swinging of the carriage containing the recording materials down, as shown in the accompanying illustration, when it is desired to change a record. The instrument, which is known as the Tapalog, is so called on account of its scheme of operation. At the present time one of these instruments is installed at the Atha works of the Crucible Steel Company of America for recording the temperature of the tool steel annealing furnaces.



A Recently Designed Autographic Temperature Recorder in Which the Record Is Made on the Under Side of the Record Strip and It Is Possible to Secure Records in One or More Colors if Desired. In the Engraving the Record Is Swung Down for Removing the Paper Strip.

The record paper used is ruled with rectangular co-ordinates, and the record is made on the underside of the strip, so that the pointer does not touch the inking ribbon. The speed of the record, which is driven by clockwork, is 1 in. per hr., and a dot is made by the depression of a bar above the pointer every 12 sec., the pointer being free to swing to its true position during the intervening period. The power for operating the depressing member which makes the dot is furnished by the three-cell dry battery. The indicating scale is mounted on the front of a chopper bar, which is pulled down by an electromagnet with a blow to make the record, and this chopping bar is over-counterbalanced so that it tends to rise quickly after the downward stroke is accomplished. When the bar is at the bottom of its stroke, the electromagnetic circuit is opened and by an arrangement of a toothed wheel on the clock, the rise of the chopper bar is retarded to a very slow speed, which it is pointed out results in the clock really being helped and thus doing away with a chance of its stopping through having too much work to do, instead of having to drive the recording mechanism.

To prevent any likelihood of the pointer of the galvanometer coming in contact with the hands of the operator in changing the record paper, etc., and thus being damaged, the whole carriage containing the recording materials has been pivoted so that it will drop down, away from the galvanometer. In this way, it is pointed out that the paper and the typewriter ribbon employed for making the records can be changed without any likelihood of injuring the galvanometer. The instrument is shown with the strip in position for changing in the accompanying illustration, the position of the paper on which the record is made being under normal conditions in the horizontal plane.

In the simplest form, the Tapalog will make a record of one temperature in one color, but as generally supplied, it is furnished with an automatic switch located in the case and operated by the battery furnishing power for operating the depressing member. This mechanism automatically switches the instrument from one thermo-couple to another and at the same time another band of the multicolor typewriter ribbon is brought under the pointer, so that different records are secured in distinctive colors, up to the number of four, as desired. As these records are all made on one sheet, differences in temperature between various parts of a single furnace or members of a battery of furnaces are readily seen. In addition to the automatic shifting of the ribbon from one color to another, there is an independent arrangement whereby the entire width of each band is utilized for making records, thus, it is emphasized, avoiding wearing of the ribbon in a single line. While provision is made for taking four records and four binding posts are provided on the outside of the case for that purpose, two records can be secured by connecting the alternate binding posts, so as to form two pairs. In this case a two-color ribbon is used. This ribbon which passes under the record paper is made in the form of an endless belt, so that it is not necessary to employ any mechanism to reverse the direction of travel.

New Pressed Steel Wheel for Light Duty

A new pressed steel wheel has been brought out by the W. J. Clark Company, Salem, Ohio. It is designed particularly for use on portable gasoline trucks in garages, but can be used for various purposes where a light duty wheel is required. Special construction features are provided to add to the strength of the wheel. The rim and web are in one piece instead of a separate rim being attached. It is constructed so that the channel part on which the tire is placed is of double thickness and the section of the web at the base of the tire has four thicknesses of metal. The wheel is furnished either with plain or ball axle bearings, either type of bearing being renewable, and with or without a hub cap and with the holes in the web as shown or without, as desired. It has a renewable rubber tire with round face and is made in sizes ranging from 24 to 30 in. in diameter.

A Wheel Made of Pressed Steel That Has Been Developed for Use on Portable Gasoline Trucks and Similar Light Duty Work

Failure of British Steel Ship Plates

How the Metal Exhibited Excellent Static Properties But Was Worthless When Worked at Low Temperatures—The Cause

The remarkable failure of a consignment of steel ship plates is recounted by W. J. B. Wilson in a paper before the Northeast Coast Institution of Engineers and Shipbuilders (England). It shows how static inspection of metal is not always indicative of its true value. An abstract of the paper follows:

In 1907 the author's firm received an order for an icebreaking cargo and passenger steamer, to be built to Lloyd's highest class, under special survey. The material for the shell, which had been tested and passed by Lloyd's, and characterized by the surveyor as excellent, failed entirely to stand the ordinary work of the shipyard, and was subsequently condemned by the surveyors, notwithstanding that it fulfilled all the requirements of the rules as regards testing.

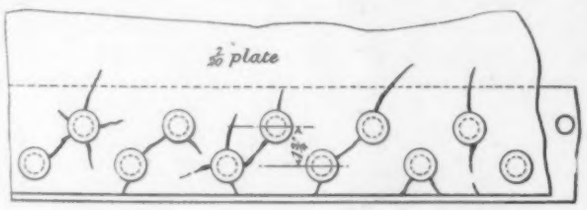


Fig.1—Cracks Developed in Riveting Shipbuilding Plates

DETAILS OF THE FAILURES

The vessel was begun in November, 1907, but the shell plating was not taken in hand until the end of December. B strake was first worked, but, owing to the difficulty with the flanging of the garboard strake plates, several of which cracked, the rest of the shell was practically completed before the garboard strakes were in place. The garboard strake plates which cracked were carefully examined, but as the results of both bend and tensile tests were excellent, the failure at the time was put down to the severe cold prevailing (about —13 deg. to —18.4 deg. F.). The riveting of the shell was well in hand before the keel riveting was begun, but after a few garboard plates had been riveted, cracks were noticed between the rivets and the edge of the plate in the flange portion, as shown in Fig. 1. These plates were condemned by Lloyd's surveyor, and cut out. During the process two of them cracked badly in the neighborhood of the keel rivets, and appeared to be little better than hard baked clay, as a single blow with an ordinary hand-hammer knocked pieces out of the flanged portion.

This sudden change in these plates, which had withstood flanging, punching, riveting, and in some cases also caulking, was very remarkable, and the job of riveting the keel was at once stopped until a thorough hammer-test of the flanged portion of all the remaining garboard plates had been made. This proving perfectly satisfactory, the riveting was resumed, and the riveters were ordered to report immediately any cracks; but only one or two occurred, and these were of a minute description.

EFFECT OF LOW TEMPERATURES

About this time the cold again became very severe, and on January 11, 1908, garboard plate No. 4 starboard, which had then been riveted in the ship three weeks, was found to be badly cracked. The crack started from a rivet hole in the flanged portion, and went off into the plate in a transverse direction, being about 10 in. long and about 3-32 in. open at the widest part. This was clearly a case of spontaneous rupture, and precisely like those described in Holmes' "Practical Shipbuilding" (page 575, paragraph 562). When this plate was cut out, the material in the way of the keel rivets cracked in the same way as those described above, and a new hammer-test was therefore made, with startlingly different results, as every plate in the garboard strakes (with the exception of those previously replaced) cracked, pieces falling out in some cases. These plates were therefore condemned and cut out. So far the cracks had been entirely confined to the flanged portion of the garboard strakes; but during the cutting-out of the edge rivets connecting the above plates to B strake, several of the plates in B strake also cracked. A new survey was then made by Lloyd's, and pieces cut out of plates in the ship, rolled from different charges, were tested. The tests all proved satisfactory to the surveyor.

Bend tests were excellent so long as the test-pieces were not taken near any rivet holes. Chemical analysis for phosphorus gave 0.063, which cannot be regarded as affecting the material. After these tests, one may judge the astonishment created when one blow of a heavy hammer was sufficient to knock large pieces out of the flanged portion of plate A.S.6.

THE PLATES REJECTED

The net result of this survey was that all plates rolled from the same charge as the garboard plates, together with several plates which had bad surface defects, were condemned. The latter had been filled with some composition, which fell away during riveting. One plate had two large holes which had been filled up. A thin feeler pushed into these holes penetrated 1½ in., while the maker's brand was not 12 in. away, on the same side of the plate. This plate was returned to the makers, after having been specially pointed out to Lloyd's surveyor. The condemned plates, 12 in number, were in various strakes of the shell-plating, and during their removal, despite the care taken, the trouble spread over the whole of the bottom of the vessel.

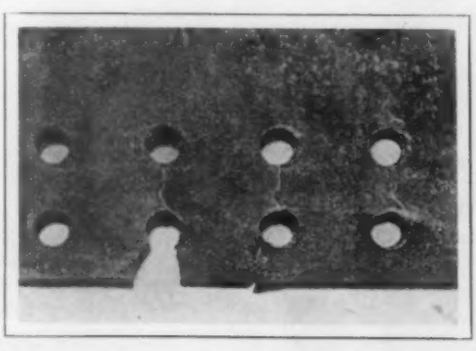


Fig. 2—Broken Plate After Being Tested at a Low Temperature in Snow and Salt

As an example, plate E.P. 3, ½ in. thick, which had been punched, sheared, bent, riveted and caulked without any trouble, had to have the rivets in its lower edge removed in order to take out a plate in D strake. When the rivets were center-punched preparatory to drill-

ing them out, the plate E.P.3 cracked, although it was not actually touched by the hammer, which was only an ordinary hand hammer. In the lower edge of this plate, when all the rivets had been drilled out and driven, the author found 16 cracks.

This plate was afterwards examined by Lloyd's surveyors, when it was plainly shown that one blow with a sledge-hammer was sufficient to cause cracks to appear between the edge and butt rivet-holes; but although the hammering was continued, not a single crack would travel far into the plate away from the rivet-holes. The failure still continuing, a new survey was made by two of Lloyd's surveyors, one of whom had previously tested the steel. Tests were made, which, like all the others, threw not the slightest light on what was really wrong with the steel.

A SPECIAL LOW TEMPERATURE TEST

After these tests had been made, the surveyors maintained that as the steel passed the tests laid down in the rules, they were not justified in blaming the material, unless a test could be devised which would, in their presence, prove the steel to be at fault.

The author, who had made scores of tests with a like object, had found one that gave the required results, and the description of this test, taken from the official report, is here given:

"At last a butt-strap, which had not been worked into the vessel, and a plate of material made in a Swedish steel works were placed in a mixture of snow and salt, and the temperature of these plates reduced to —4 deg. F. The plates were then quickly punched on one side for double riveting and riveted together, care being taken that the edges of the plates opposite the holes were kept cool with ice (as much as possible to represent conditions when working in a low temperature). After the plates were allowed to cool down, the rivets were driven out, during which operation the one plate cracked badly and a piece fell out. The broken plate is shown in Fig. 2. The plate from the Swedish steel works was also inspected, but did not show the least signs of cracks.

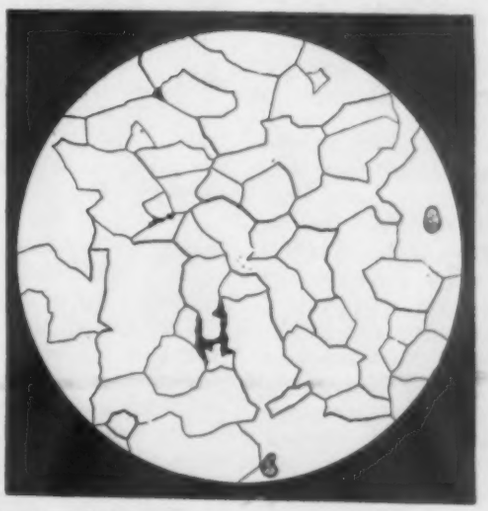


Fig. 3—Micrograph of Fractured Ship Plate, Transverse Section, Magnified 184 Diameters

"From another plate two strips 60 mm. wide were cut, and four holes ⅝ in. in diameter and 4½ diameters apart were punched and the strips riveted together. The same was done with two similar strips, but with drilled holes, the temperature at the time being about 39.2 deg. F. After cooling, the strips were bent through an angle of 25 deg.; the outer strip was found to be broken right through in the punched sample and cracks found in the drilled sample."

These butt-strap tests were sufficient to convince all concerned that the material was really entirely spoiled by riveting, as the extracts from the report of the surveyors given below show, and in which the builders are relieved from all blame, the workmanship being characterized as first class. A further proof that the material was bad is the very conclusive one of the new Swedish material, which, although worked in the same way, gave no trouble at all.

THE SURVEYOR'S REPORT

Quoting from the surveyor's report:

"Samples cut from the center or near the center of the plates were then flanged under different circumstances, and the results of these tests seem to indicate that the material is liable to crack, and is becoming very brittle when heated and hammered, even when this heating only reaches the temperature called forth in the plates by the hot rivets.

"I never believed that steel could break so badly; a single blow with a hammer of about 6 lb. weight was sufficient in most cases to crack the material between the holes or between the holes and the edges. A strong blow broke whole pieces from the edges, and even we have beaten a hole of about 6 in. in diameter in one blow with a light sledge-hammer. Before riveting, these plates could be punched, bent and hammered, but as soon as the plates had been riveted the steel was spoiled altogether. * * * I may still add that in my opinion the shipbuilders are not at all to blame. The workmanship seems to be first class, and every precaution seems to have been taken to treat the material well."

That material such as has been described in this paper is manufactured and afterward tested and passed by the various classification societies as an everyday occurrence, the author does not for one moment insinuate, nor, further, that the utmost has not been done by the societies as far as the recognized tests would allow.

THE METALLURGIST'S REPORT

At the instance of a friend, the case of the plates dealt with in this paper was submitted to Prof. J. O. Arnold, of the University of Sheffield. Extracts from his report, which shed further light on the subject, are given below:

Department of Applied Science,
St. George's-square, Sheffield.

Dear Sir:—With reference to our examination of the broken ship-plate from Finland, we have obtained the following results:

Chemical Analysis

	Per cent.
Carbon	0.05
Graphite	Trace
Silicon	0.08
Manganese	0.86
Sulphur	0.08
Phosphorus	0.06
Arsenic	Trace

The material is a dead-mild steel which, from a chemical point of view, is not of very good quality. A micrographic examination showed the structure reproduced in the accompanying micrograph (Fig. 3). The very small carbon contents are centered into dark etching areas, best described as the fourth phase of pearlite—namely, when it is passing into ferrite and massive cementite. When such high sulphur as 0.08 per cent. is present, dove-grey areas of sulphide of manganese are scattered through the steel in very appreciable numbers. The crystals have sharp angular boundaries; indeed, the material appears to have been overheated in the manufacture, and gravely injured by the operation.

A number of alternating stress tests gave extremely unsatisfactory results. The conditions of testing were the standard method adopted here. The bars were ⅝ in. in diameter, and the distance from the zero of stress to the plane of maximum stress 3 in.; the deflection each way on the zero plane was ⅜ in., and the rate of alternation 650 per min. Good mild steel should endure a minimum of 300 alternations of stress. The faulty steel, however, in eight tests averaged only about one-third of this, or 100 alternations. This is the worst steel of its class I have ever examined under alternating stress.

I have not had the tensile tests made, as in such cases these would be of very little use, usually giving very fair results. The bends have bent double without any sign of a flaw. This also is quite usual.

I am a little puzzled as to the origin of this steel, since the high silicon, 0.08 per cent., suggests an acid steel. It may, however, be a basic steel, over-treated

with ore, to which manganese and silicon have been added in the ladle. If the carbon were, say, 0.2 per cent. instead of 0.05 per cent., I should with some confidence class it as Bessemer steel; as it is I find it difficult to suggest its method of manufacture with any degree of certainty.

The overheating to which I referred would take place in manufacturing the plates from the slab ingots. When such ingots are heated to too high an initial temperature and rolled, they leave the rolls at too high a temperature, cool too slowly and crystallize; and if such plates are stacked in heaps to cool, it is obvious that the cooling is still slower, and the crystallization more perfect, and hence more dangerous.

J. O. ARNOLD.

That the ordinary methods of testing were in this case insufficient to detect this bad material certainly seems to place shipbuilders and others in a position in which they run grave risks. It is certainly worth considering whether the tests, in connection with which a mixture of snow and salt was used, described above, should be adopted or not, as they decidedly detected the fault in this steel.

BURNING BLAST FURNACE GAS*

Bradshaw-Huessener Combustion Arrangement Involving Burner and Damper Regulator

It is generally recognized that the present method of using blast furnace gas under boilers is uneconomical. Scores of experiments have been made to improve the boiler efficiency, but the results hitherto obtained have always fallen short of the efficiencies obtainable from the same boilers when burning coal.

To get as high efficiencies it is necessary to obtain complete and quick combustion with a very low excess of air. In other words, get the highest initial temperatures possible, and the rear temperatures will look after themselves. The only method of obtaining this is to mix gas and primary air before ignition, and to reduce the secondary air to the lowest possible amount compatible with complete combustion. It would appear that simply to apply the bunsen principle to the burning of blast furnace gas would offer a solution of the problem. This is, however, only partly correct. The bunsen burner depends on a somewhat even gas pressure, at least. Although it makes use of the kinetic action of the gas, it does not, owing to the large friction in the mixing tube, maintain a constant relation between the gas and the primary air aspirated by the gas, irrespective of the quantity of gas passed. As a matter of fact an increase or decrease of the quantity of gas will always necessitate a resetting of the primary air valve. Then again for a bunsen burner there will always be a point where it flashes back. That happens when the quantity of gas is so small that the friction loss absorbs the whole of its kinetic energy.

It will be seen at once that at American blast furnace plants that principle cannot be employed to advantage, as it is out of the question to supply gas under a constant pressure. A possible way of overcoming this difficulty suggests itself in the form of gas governing devices which will reduce the gas pressure to a certain maximum and regulate the bunsen burner accordingly. Apart from the fact that there would still be the difficulty of dealing with gas pressures lower than the maximum, and the question of relighting and re-regulating a bunsen burner, for instance, in the case of a one-furnace plant where the gas, during the casting periods, will stay away altogether for a few minutes, there is one very weighty objection to using pressure-regulating devices in blast furnace gas mains. With the very large furnaces in use in this country, slips are regular occurrences, and a result of a slip is that the gas pressure may be momentarily increased by as much as a few hundred per cent. This sudden increase in the quantity of the gas requires a relief and the natural safety valves for the American blast furnace plants are their boilers. For this reason it would not be safe to interfere with the gas mains by placing in them obstacles to the free flow of the gas.

A gas burner alone cannot take care of the combustion of the gas, although it is a most essential part of any combustion arrangement. All a gas burner can do is to supply a mixture of gas and primary air before ignition, and if it does that and keeps the relation between gas and air constant, whatever the gas pressure is, it has done everything that it is possible for it to do.

In addition to the mixing function, a second factor that requires regulation is the secondary air, which is just as essential for good results as the primary air. The secondary air is dependent solely on the chimney draft and will, for a given position of the damper, vary inversely as the amount of gas admitted which, of course, is just what is not desired. The chimney draft itself is a varying quantity, also, as it depends on the temperature of the waste gas, the outside temperature, the wind velocity at the top of the stack, etc., all factors which are subject to continued changes.

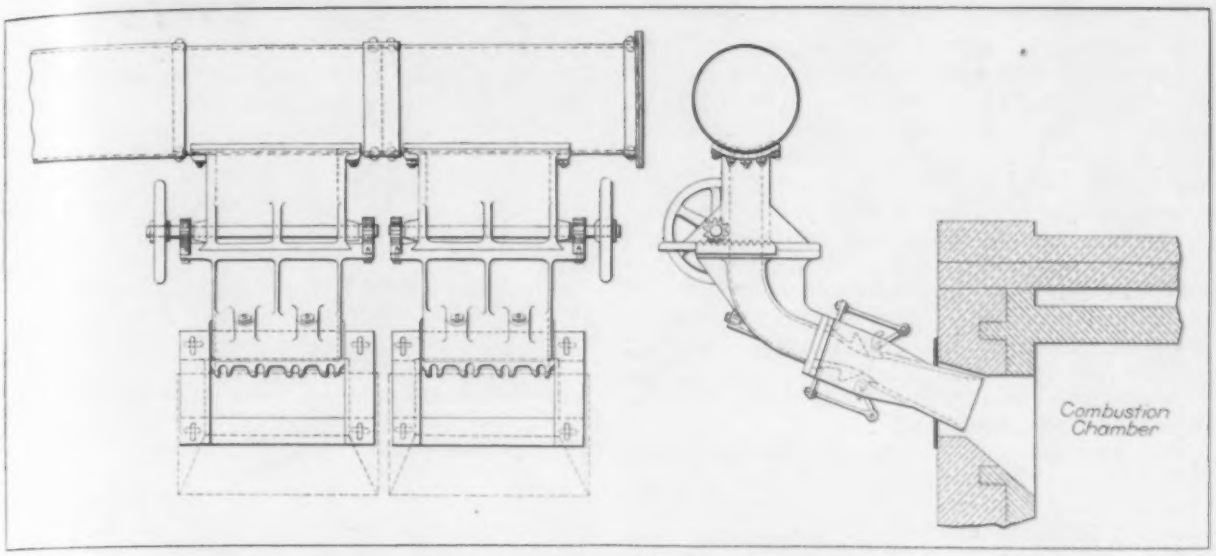
It is therefore evident that in order to keep the secondary air in a constant relation to the quantity of gas passed, the dampers must be automatically regulated. Now the gas in the combustion chamber of a boiler is directly affected by the quantity of gas admitted, and will decrease for the same position of the damper with an increase of gas, and vice versa. Further, the velocity of the products of combustion, when passing through the boiler, again depends on the aperture of the damper, and, as for constantly good results this velocity must be kept constant, it is again shown that a governing device for the dampers is indispensable.

The accompanying illustrations show the apparatus which, used together, constitute what is known as the Bradshaw-Huessener combustion arrangement. The one shows the Bradshaw burner, invented and developed by Grant D. Bradshaw, steam engineer of the Cambria Steel Company, Johnstown, Pa., where 40 boilers are fitted with the burners. The other shows the damper governing device.

The burner departs from the general bunsen principle in that a gas injector is used. The burner is oblong in shape and a cross section through its mixing chamber is an expanding cone. The advantage of the device is that the gas expands while traveling through the combustion chamber, thus overcoming the difficulty of friction which, as intimated, is fatal to the use of the bunsen principle. The result is that however much or little gas passes, the full benefit of the kinetic energy is retained, and the quantity of air drawn into the burner is in a constant relation to the weight of the gas passed, so that even great changes in the temperature of the gas are automatically provided for. The burner does not require different dimensions for clean and unclean, or hot or cold gas, and all that has to be done is to adjust the primary air inlet for the particular quality of gas supplied.

The damper governing device has a small electrically-driven oil pump which circulates oil under 60 lb. pressure. The gas bell shown in the drawing

*Based on a report made by K. Huessener, president Power Gas Economy Company, 324 Diamond street, Pittsburgh.



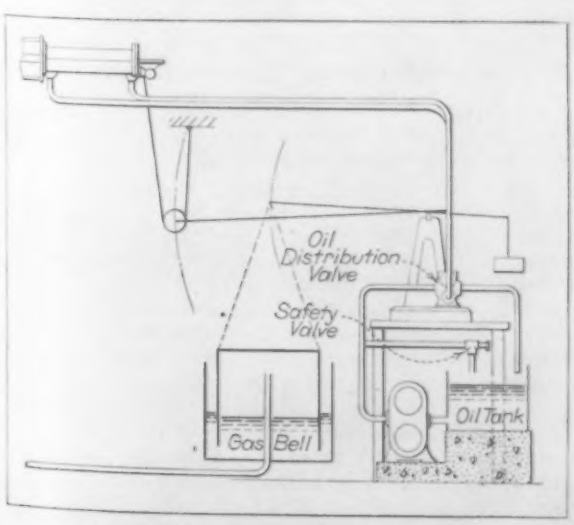
Elevation and Cross-section of the Bradshaw Gas Burner Applied to Steam Boiler

is connected with the combustion chamber of one of the boilers and weighted for such draft as will give most favorable composition of the waste gases. This gas bell actuates, through suitable gearing, a double piston valve. If the draft in the combustion chamber decreases on account of an increased gas pressure, the gas bell will raise and open the upper piston valve, admitting the oil under 60 lb. pressure to one side of a piston which works in a cylinder. The piston carries a piston rod which is connected by suitable gearing to a shaft, which, in turn, actuates all the dampers of a boiler battery simultaneously. The dampers will be opened sufficiently to restore the old draft in the combustion chambers, while the reverse action takes place in the case of an increased draft.

To guard against slips, a three-way piston valve operated by a separate gas bell is fixed in the pipe coming from the combustion chamber. The gas bell is governed from the gas main and is weighted for the highest ordinary gas pressure. As soon as the gas pressure rises above this point, as, for instance, in the case of a slip, the three-way valve will connect the draft bell with the atmosphere, with the result that all the dampers are wide open before the effect of the slip occurs. When the slip has passed, the three-way valve will return to its old position, and the automatic governing of the dampers will be at once resumed.

Recording charts have been taken of the equipment of 40 boilers at the Cambria Steel Company, these being Babcock & Wilcox boilers rated at 300 hp. each. One chart showed that the gas pressure in 24 hr. varied between 2 in. and 5½ in. water column, the lowest pressure being only 36 per cent. of the highest pressure. It is to be noted that this chart was taken from a one-furnace plant, with drops in pressure to zero at casting times.

The chart of the CO_2 record corresponding to the varying gas pressure showed that the CO_2 was kept constant at about 23 per cent. The temperature of the waste gas was 495 deg. F., and as the temperature of the boiler house was 70 deg., the rise in temperature was 425 deg., and it can be shown that the losses through waste heat under such conditions are about 14 per cent. The radiation and conduction losses being below 5 per cent., the total efficiency of the boiler plant exceeded 80 per cent. These results were obtained on unclean blast furnace gas without supervision or hand regulation. The tubes of the boiler were blown twice in 24 hr.



Scheme of the Damper Controlling Device

Validity of Kentucky Compensation Act

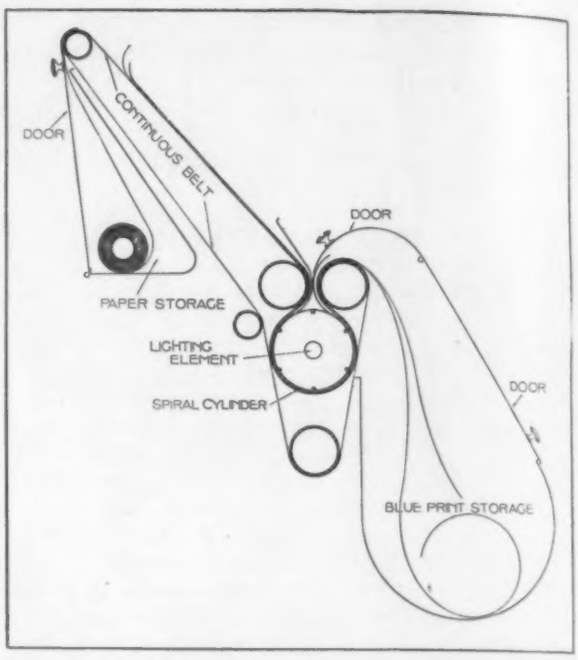
Reference was recently made in *The Iron Age* to a decision of the Kentucky Court of Appeals declaring the workmen's compensation act of that State unconstitutional in certain features. In a supplementary opinion, that court says:

"While in no particular receding from the position taken in the opinion herein, we have thought proper to make certain statements therein more explicit: 1. The provisions of the present compensation act, as far as they affect the employer, are unobjectionable, as they do not conflict with any provisions of the constitution. 2. Any employee coming within the provisions of the act may voluntarily agree to accept its provisions fixing and limiting his recovery in case of injury. 3. He may likewise voluntarily accept the provisions of the act fixing the amount that shall be recovered in the event of his death, and said sum should be paid to his dependents, if he leaves any, and, if not, to his personal representative. The Legislature has no power to direct that this sum shall in any event be paid into the compensation fund. 4. Some provision should be made in the act whereby the employee signifies his acceptance of the provisions of the act by some affirmative act on his part. Silence on this subject should not be construed into acceptance. 5. Provision should be made in the act for appeal to a court of competent jurisdiction for review in all cases where compensation is denied or where a less sum is allowed by the board than that claimed by the injured employee." (State Journal Company vs. Workmen's Compensation Board, 172 Southwestern Reporter, 674.)

New Continuous Blueprinting Machine

A continuous electric blueprinting machine shown in the accompanying illustration has recently been brought out by Wickes Brothers, Saginaw, Mich. This is a small, compact machine, simple in construction and operation and with various features not found in other machines of this type. In operation it is claimed to be unusually economical. In this machine the contact between the tracing and the paper is secured by a single wide continuous belt that passes around the feed rolls and the metallic printing cylinder in which is located the lighting element. The belt is arranged so that it comes in contact with over 92 per cent of the circumference of the cylinder. The tension of the belt is regulated automatically.

The printing cylinder which surrounds the lighting element instead of being of glass is made of longitudinal and spirally disposed bronze wires woven right hand on one side of the center of the machine and left hand on the other. This is said to give a desired ironing or spreading effect to each side of the tracing and a perfect contact between the tracing and the paper. The light is obtained from a mercury vapor lamp of standard pattern, of a type rich in chemical light, practically all the energy being given out in actinic rays. It is claimed for the mercury lamp that it gives no more trouble to maintain than an ordinary incandescent lamp and that it does away with the necessity of renewing the carbons were an arc lamp used. It operates at a low temperature and is said to require no attention from the operator. The light is projected directly in a radial line through the tracing without having to pass through any intervening glass and without being deflected by reflectors. It is said that the wire cylinder affords less actual obstruction to the light than a glass cylinder would, and the light is brought close to the blueprinting paper, the distance from the light to the paper being only 2 in. around the entire circumference. As the wire cylinder permits free circulation and escape of air, heated by the light, a ventilating fan is not necessary. It is stated that the total current consumption of the machine, including the lighting element and motor at 110 volts is only 5 amperes, 3½ amperes being required for the lamp. The motor is connected to a variable friction feed allowing a wide range of adjustment.



A Sectional Elevation of the Machine Showing the Arrangement of the Different Parts and the Scheme of Operation

In the front just below the feeding table, is a light-tight magazine which provides storage room for three or four rolls of blueprinting paper. In continuous printing the paper passes from this storage compartment over the feeding table which is at an angle of 45 deg. and down to the feeding rolls. The blueprinting paper and tracing then travel around the printing cylinder, the tracing being delivered to the operator, if he so desires, or it can go with the blueprinting paper into the light-tight storage compartment in the rear of the machine. Because of the light-tight compartments there is no necessity for an operator working in a darkened room. Feeding the tracing and the blueprinting paper through the machine at the rate of 1 ft. per min. allows the operator to print, trim, wash and dry prints without stopping the machine. The machine will print continuous rolls or separate cut sheets as desired. It has a capacity for making blueprints in any desired length and in widths from 2 to 48 in. The machine is entirely self contained and occupies a floor space of 2½ x 5 ft. and is 30 in. high.

A Self-Contained Continuous Electric Blueprinting Machine in Which the Tracing Is in Contact with Over 92 Per Cent. of the Surface of the Printing Cylinder

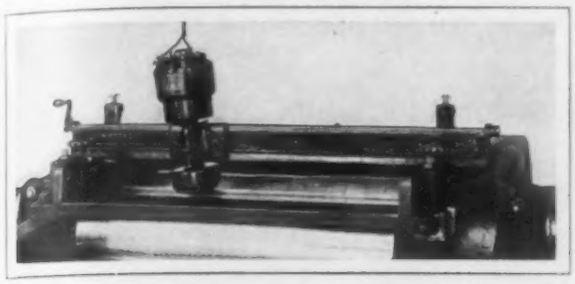
Southwark-Harris Valveless Engine

The Southwark Foundry & Machine Company, Philadelphia, has secured the United States license to manufacture the Harris valveless engine, Diesel principle, which will hereafter be known as the Southwark-Harris valveless engine. It will be built in sizes from 75 bhp. to 1000 bhp. for both marine and stationary service. The Southwark Company will have with it Leonard B. Harris, the inventor of the Harris valveless engine, as consulting engineer and naval architect, and J. P. Johnston, who has been connected with the development of the Harris engine, will be in charge of oil engine sales.

The development of machine tools has been made the subject of a meeting of the American Society of Mechanical Engineers, to be held at New Haven, Conn., on April 21.

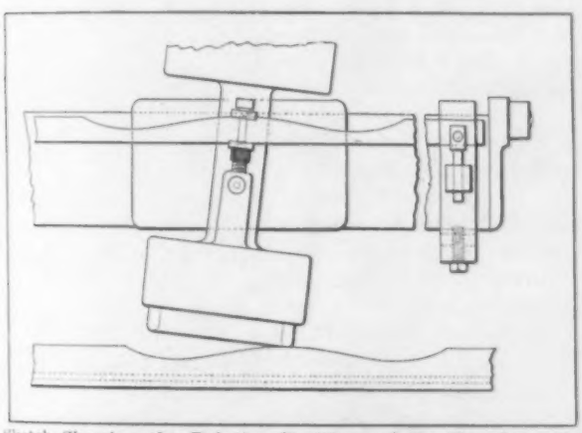
Attachment for Grinding Curved Knives

For grinding tapered or curved machine knives, the Stockbridge Machine Company, Worcester, Mass., has developed an attachment for use in con-



Grinding an Irregularly Shaped Wood-Working Machine Knife Without Removing It from the Machine

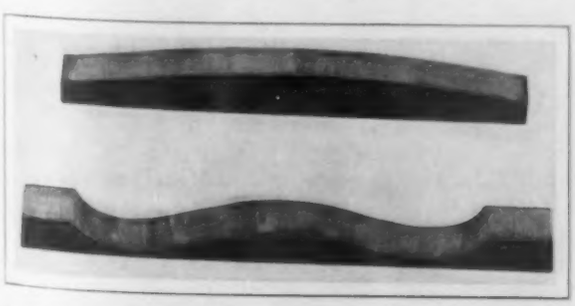
junction with its Quicsharp grinding machine, which was illustrated in *The Iron Age*, February 26, 1914. The attachment consists of two brackets that fit on the bridge of the grinding machine and have projecting arms to hold the template. The template passes between two guide plates attached to the spindle controlling the elevation of the grinding wheel, as is shown in the accompanying drawing. A piece of bandsaw or other thin material is used for the template, which is straight on the bottom and made in the desired shape on the top. It



Sketch Showing the Relative Positions of the Template, the Grinding Wheel and the Knife That Is Being Sharpened

is held stationary at the ends, so that as the head travels along the bridge, the spring tension on the spindle holds the upper guide plate on the curved edge of the template and causes the grinding wheel to follow the same curve,

The grinding wheel is motor-driven, and the motor is mounted in the grinder head, the current being taken from an ordinary lamp socket. The feed screw lies along the top of the bridge, and a split nut is attached to the saddle of the grinding machine, thus enabling it to be fed in either direction along the entire length of the bridge at any desired speed. The bridge is supported either at the ends or some other convenient points by two angular brackets bolted to the bed of the machine proper, this construction being relied upon to hold the grinding machine rigid. The wheel is of the cup type and a tension spring in it keeps the pressure uniform on the wheel. This arrangement, it is emphasized, will prevent the knives from being overheated and burnt.



Two Typical Templates Used with the New Attachment for Grinding Knives

A Motor-Driven Auxiliary Grab Bucket

A motor-operated clamshell grab bucket has been designed by the Mead-Morrison Mfg. Company, Boston, Mass., as an auxiliary to the electric traveling crane of the foundry. It is intended for handling such material as sand and slag, when this form of digging is a factor of economy. The capacity of the bucket is from 1½ to 2 cu. yd.

A New Clamshell Bucket That Has Been Developed as an Auxiliary to the Traveling Crane in the Foundry

The motor is incased at the uppermost part of the top head and transmits power to the drum shaft through a Morse silent steel chain. A friction clutch is relied upon to act as a safety device, permitting the drum to slip in case the operator should neglect to turn off the power after the bucket has been closed. Interlocking links tend to prevent the top head from slipping if, for example, the bucket should land on the side of a pile of material. A hinged gear, which is not shown, is relied upon to serve the same purpose for the bottom head.

The control of the bucket rests entirely with the crane operator. When the bucket is not in use, the wire connecting its motor with the controller in the cab is carried on a drum mounted on the crane bridge within convenient reach. When the bucket is picked up by the operator, the connection is plugged in, and the grabs open and close in accordance with the movement of the controller handle.

Mumford Molding Machines

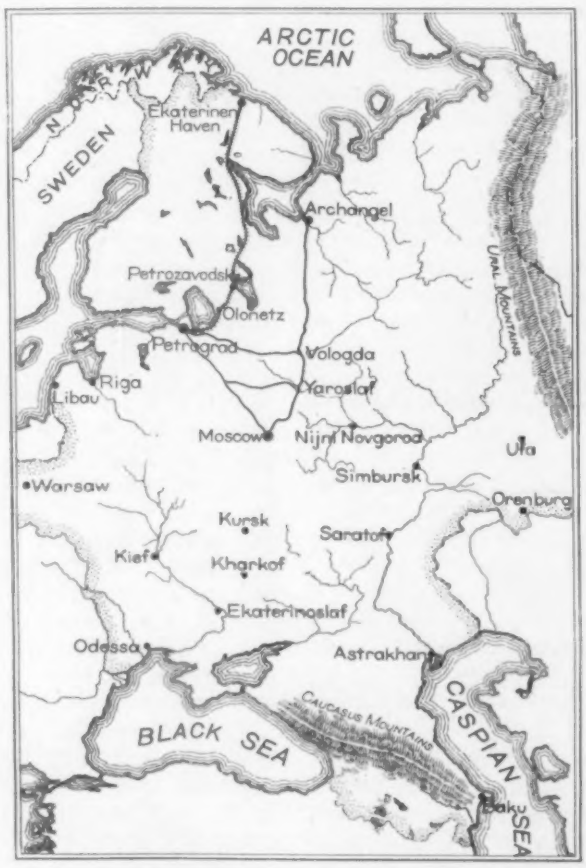
The E. H. Mumford Company, Front and Franklin Streets, Elizabeth, N. J., announces its return to the molding-machine business. It owns free from all litigation all patents on the inventions of E. H. Mumford and applications for patents under which the Mumford Molding Machine Company has been operating since 1909. A manufacturing arrangement has been made with the Samuel L. Moore & Sons Corporation, Elizabethport, N. J. A complete line of molding machines will rapidly be put on the market, made interchangeable with all previous Mumford machines as far as practicable, and the new machines will embody many points of merit made possible in redesigning. Mr. Mumford calls attention to the fact that after 15 years spent elsewhere he is again in the identical spot where he joined Harris Tabor in the development of the first vibrator molding machines, which was in 1895.

American Opportunity for Russian Business

An Interview with Capt. David L. Hough—What American Manufacturers Must Consider—Reconstruction Demands of Russia Not Appreciated

American business needs to prepare for the period of reconstruction in Russia succeeding the European war. The volume of business will be far larger than is generally apprehended in this country, but the business man here will probably have to go at least half way if he expects to get the share which is otherwise his practically for the asking. This, in a few words, is the burden of an illuminating interview had by *The Iron Age* with Capt. David L. Hough, who has spent the greater part of the last four years in Russia and ought to know something about the situation in that country.

That Russia is a land of possibilities for far greater direct commercial relations with this country than has obtained heretofore has been frequently argued with figures and voluminous statistics. Information, though general rather than intimate, has been spread widely in this country regarding Russia, and in the main it remains for individual efforts of business and financial interests to take advantage of the opportunity offered. How to get the buyer and seller together is the problem. The buyer in Russia, Captain Hough emphasizes, likes to see what he is buying just as does the American buyer, and he will be slow to take chances just as we would were the conditions reversed. The American, with confidence in his product, will be concerned chiefly over payment; the Russian, with intention to pay the prices asked, will require besides guarantees of compliance with specifications that he see the article.



AN ICE-FREE PORT FOR RUSSIA

Where the Gulf Stream gives up its ghost, 500 miles nearer the United States by water than Archangel, will be established a railroad terminus at a hitherto little-used harbor which may be reached by boats throughout the winter. The Olonetz Railway, a private railroad, is now under construction from Petrograd to Petrozavodsk, and a government railroad is being built to connect Petrozavodsk with Ekaterinenhaven. The present indirect railroad connections between Archangel and Petrograd are shown.

It is probable that those American houses which secure representatives in Russia will have the easier time in closing for business, and while there is evidence that Russia is developing a desire to do business with this country it does not follow that American business can expect the Russian buyer to provide purchasing representatives or, except in special cases, to furnish inspectors in this country for checking shipments. Equally important is the need to promote banking facilities, but when banking interests become fully aware of the active campaign even now being projected by American manufacturers to capture some of the Russian business, it seems clear that American banking houses will establish branches in Russia. Particularly is this likely when it is appreciated that the normal value of importations into Russia has been, as Captain Hough agrees, much greater than the total business going to South American countries.

LARGE RUSSIAN PROJECTS CHECKED BY THE WAR

Captain Hough's views are particularly valuable, not alone because of his residence in Russia, but because he was actively identified with a number of unusually large projects held up on account of the war. He has enjoyed an intimate contact with Russian business affairs. At the breaking out of hostilities he was about to engage in a monumental undertaking to bring the railroads centering at Moscow into a central passenger station. None of the nine railroads radiating from the city, six of them government railroads, pierces even the outer line of fortifications of the city, so that the stations are 2½ to 4 miles from the center of the city. The work involves tunneling, as the city, as will be recalled, lies on a plateau in a wide plain, which fact led to the selection of the site for the city centuries ago.

As head of the United Engineering & Contracting Company, which built the Pennsylvania Railroad tunnels under the Hudson River at New York and which completed the New York subway tunnels under the East River and has done other large and conspicuous engineering work in this country and in Cuba, Captain Hough was engaged for a work for which he was well equipped. The fact of his selection is indeed a matter of gratification in its recognition of American engineering and contracting ability and has, as already noted, given Captain Hough unusually close intimacy with Russian business methods, viewpoints and ideals. It is interesting to note incidentally how much dependence was placed on American ability in the Moscow railroad station enterprise. Captain Hough represented the contracting engineer in the work; the late Alfred Noble and his associate, Silas H. Woodard, were retained as the engineers, and both American architecture and American railroading experience were called in; Whitney Warren, of the firm of Warren & Wetmore,

architects for the Grand Central Station in New York City, being the architect for the Moscow station, and Samuel Higgins, formerly general manager of the New York, New Haven & Hartford Railroad system, being the consultant on the railroad problems. Captain Hough gets his title from being captain of the First Regiment, United States Volunteer Engineers.

Meanwhile, Captain Hough had himself seized other opportunities, and for other contracting work had established a firm of Russians, of which he is the American member. This firm was one of four bidders for the first elements of a $35,000,000 water supply system for the city of Petrograd, work which also is held up on account of the war. When it is mentioned also that Petrograd is planning to install a sewerage system, now altogether lacking, and that this will involve an expenditure of some $60,000,000, an idea may be gained of the activities on which Russia was intent prior to August 1, when the European powder magazine exploded.

AN ICE FREE PORT

Another unusually important undertaking, important not only from the amount of the money which will be required, but from the commercial influence which it is likely to exert, is a railroad which Captain Hough says is being built somewhat northward from Petrograd to a point on the Arctic Ocean, not far away from the Norwegian frontier. Not only will the terminus of this railroad be about 500 miles west of Archangel and that much nearer this country, but it is on a portion of the coast line of Europe where the Gulf stream, so to speak, gives up its ghost. In short, the Gulf stream traveling northeast along the coast of Norway, skirts its northern shores within the Arctic circle until it loses itself on the shores of Lapland, through which the proposed railroad will pass. The railroad will not tap a populous territory, to be sure, but will connect Petrograd with a port that can be reached by vessels throughout the winter. Archangel becomes ice bound when winds of certain directions drive into the White Sea, blockading the entrance of the sea into the Arctic Ocean.

Little if anything has been said in the public prints concerning this railroad, which can even be built during the progress of the war, as the Finns, who are not called into war service, are available. The road is to pass through Petrozavodsk, on Lake Onega, as shown by the accompanying map, with the northern terminus at Ekaterinenhaven, probably 750 to 800 miles from Petrograd. The distance would probably not be more than 150 to 200 miles farther than Archangel is from Petrograd.

RUSSIA TO GO INTO MANUFACTURING

One thing Captain Hough calls attention to is that Russia desires to furnish her own material and do her own manufacturing, but in the reconstruction period, with the tremendous amount of work which will be pressing for completion within a short time, assistance from outside the country will be needed. According to the feeling at present existing in Russia, Germany will not get the business, other things being equal. In fact, it will probably be only through decided price concessions or advantages with regard to times of delivery that Germany will reclaim some of her former business. England will make a drive for some of the Russian business, but it is felt that with the need for capital in England American industry will have a better show, not to mention the fact that demands will be great for England to assist in reconstruction in Belgium and perhaps in France.

Russia is awakening, Captain Hough agrees, at a marvelous rate. Demands for large number of schools will quickly develop and along with them a liking for things not at all enjoyed at the present time. A rapid expansion in general building work is expected, and simultaneously the extension and building of numerous railroad lines. The co-operation of American engineering will continue to be sought, as it has already in the case of the Moscow central station, owing to American experience and success in handling such projects. American machinery for its reputation will similarly be in demand.

It is not necessary to enumerate the figures which have been given by others to prove the really large amount of manufactured products sent by the United States to Russia. It is believed that hereafter most of them will go directly to Russia rather than being transshipped, as has been the case in the past to a large extent, at German, English, Danish, Swedish and other European ports. In view of the fact that so much of the export business with Russia has been done with the handicap of the profit taken by middlemen, it ought to be easier to increase the amount of business formerly done. Finally, it may be stated again that American manufacturers and exporters must study the market, perhaps to the extent of establishing early branch connections, preferably with Russian affiliations, although the American manufacturer will naturally have a greater feeling of confidence when an American familiar with his own way of thinking and with whom he is acquainted is a part of this Russian connection.

A Russian View of the Coming American Opportunity

S. N. Syromiatnikoff, a former editor of the moderately progressive newspapers Slovo and Rossiya and in this war one of the few privileged correspondents with the Russian armies in Poland and Galicia, has written the following, taken from a short article contributed by him to the New York Times of March 15.

HOW GERMANY GOT RUSSIAN BUSINESS

Germany did not obtain her supremacy in the Russian market through the mere fact of her geographical propinquity, nor did she gain it through the great development of her industries. She set herself to the task of studying Russia, her language, markets, customs, her agrarian and agricultural standing, her system of credit and her means of communication. Then she inundated Russian towns, large and small, not only with printed prospectuses and circulars of her trade, but also with a host of her commercial travelers, all speaking Russian after a fashion, who gathered information about the solvency of the customers, and persistently pressed upon them their German goods, whether they were wanted or not.

ENGLISH SCHOOL OF RUSSIAN STUDIES

Some seven years ago England made her first step in following this good example. She founded the School of Russian Studies, at the University of Liverpool, to afford means for young men to prepare themselves for various branches of activity in Russia, whether scientific, consular or commercial. An old friend of mine, Professor Bernard Pares, who has traveled widely in Russia and is the author of a good book, "Russia and Reform," was the one to initiate and carry out the idea of this school. Its programme includes study of Russian language, of

Russian history and economics. The Anglo-Russian Chamber of Commerce in London is very liberal in its support of the school. The students are sent to Russia to perfect themselves in the language and to study special branches of Russian life. During the last three years the school has published a very valuable quarterly, the Russian Review, containing many important articles about Russia and Poland, and written by both Englishmen and Russians. Many eminent Russians in political life and professors figure among the contributors of this review.

NOW FOR AN AMERICAN-RUSSIAN SCHOOL

The moment for the systematic study of Russian in the United States has come. It should not be allowed to slip by. A school of Russian studies must be organized in New York. All the Russian scholars and sympathizers with Russia in this country should be summoned, under the leadership of Columbia University, and they should discuss the matter immediately. The citizens who have caught up a few drops of the golden shower of Russian orders must contribute to the organization of such an institution, which, beyond a doubt, would prove most useful for the furtherance of commercial connections between the great Empire and the great Republic. The students of the American school of Russian studies would meet with the warmest kind of welcome on the part of Russian universities and the Russian Government.

Heat Energy from the Bessemer Process

A Calculation of the Value of the Gases from the Nose of a Steel Converter—Its Utilization Estimated to Reduce Ingot Costs $2 a Ton

BY G. BUTZ

In the iron and steel industry great strides have been made in the saving of fuel by the utilization of the heat in waste gases from the furnaces. These gases invariably pass off at high temperatures and in enormous quantities; so that, the calorific power they carry with them is proportionately large. Not long ago the gases from blast furnaces began to be utilized to produce hot blast through the use of hot-blast stoves and to generate steam by burning them under steam boilers. The hot gases from the puddling furnaces are generating steam by passing through boiler flues on their way to the stack. The gases from the open-hearth furnaces are about to be utilized in the same manner as those from the puddling furnace. All these steps toward the utilization of the heat in waste gases have been carried through without interfering with the metallurgical process and have proved themselves to be savers of enormous quantities of fuel.

While the advantages gained by the above methods are very gratifying, yet there seems to be a sense of sluggishness on the part of the steel companies to follow up the opportunities which are awaiting development in this field. It is the object of this discussion to attract attention to the enormous waste of heat which is taking place in the Bessemer process for making steel. And the desire to attract that attention is born of the belief that this heat can be utilized in somewhat the same manner as in the above-mentioned processes and to a greater degree of efficiency. There is, of course, no question but that the heat escaping from the nose of the converter during the blow is of enormous value; but just what the value of that heat is has no doubt been a matter of conjecture.

The calculations which follow apply of course to one particular heat of steel. But the analysis of the hot metal charged shows it to be a fair sample of the general run of Bessemer pig iron. A reasonable difference in the results of the calculations on any heat of steel, however, would not affect the purpose which is merely one of investigation. Therefore let us accept the following example and proceed to solve it for the value of the heat in the escaping gases.

On July 15, 1908, the following heat was blown at the Bessemer steel works of the Lackawanna Steel Company, Lackawanna, N. Y.:

Hot metal charged	28,000 lb.
Scrap charged	1,000 lb.
Ferromanganese (recarburizer)	170 lb.
Steel ingots resulting	26,960 lb.

	Car.	Si.	Mn.	Sul.	Phos.
Hot metal charged, per cent.	4.27	1.48	0.75	0.038	0.096
Blown metal, per cent	0.045	0.014	0.11	0.045	0.110

The analysis of the gases liberated from the bath is assumed to show the following approximate average composition:

Carbon dioxide, CO_2, per cent	5.00
Carbon monoxide, CO, per cent	20.00
Hydrogen, H_2, per cent	1.40
Nitrogen, N_2, per cent	73.6

Length of the blow: 14 min. 20 sec.

Note that, in the absence of observed data, I have made the following assumptions:

(1) That the theoretical amount of oxygen needed is the actual amount used.
(2) That all of the iron (Fe) lost is oxidized to slag in the form of FeO.
(3) That the air enters the tuyeres at 0 deg. C. and no account is taken of its atmospheric condition.

Any or all of these assumptions throw the final result lower than it really would be under actual conditions.

Calculations: Impurities Oxidized.—The percentage and weight of each element oxidized is estimated:

Percentage of weight:

Silicon	1.48 — 0.014 =	1.466 per cent. to SiO_2
Manganese	0.75 — 0.11 =	0.64 per cent. to MnO.
Carbon	4.27 — 0.045 =	4.225 per cent. to CO and CO_2

Weights of impurities:

Silicon	28,000 × 0.01466 =	410.5 lb.
Manganese	28,000 × 0.0064 =	179.2 lb.
Carbon	28,000 × 0.04225 =	1,183.0 lb.
Total		1,772.7 lb.

The Fe oxidized is calculated from the given weights as follows:

A 30 per cent. loss is figured on the ferromanganese added, which is about 80 per cent. pure manganese.

The manganese lost is $170 \times 0.80 \times 0.30 = 40.80$ lb. The loss of iron is therefore:

Total weight charged	29,170 lb.
Total weight ingots	26,960 lb.
Total weight lost	2,210 lb.
Si., Mn., and Car. lost	1,772.7 lb.
Mn. from the ferromanganese	40.8 lb.
Fe lost	396.5 lb.

Weight of Oxygen Required.—This is calculated from the analysis of the gases: 1/5 of the carbon forming CO_2, and 4/5 of the carbon forming CO, hence:

1/5 × 1183 = 236.6 lb. of carbon forms CO_2.
and 4/5 × 1183 = 946.4 lb. of carbon forms CO.

Then by proportion of the atomic weight of oxygen to the atomic weight of the base of the oxide formed, we can get the weight of the oxygen required as follows:

C. to CO_2	$236.6 \times 32 \div 12 =$	630.93 lb. oxygen
C. to CO	$946.4 \times 16 \div 12 =$	1,261.86 lb. oxygen
Si. to SiO_2	$410.5 \times 32 \div 28 =$	938.3 lb. oxygen
Mn. to MnO	$179.2 \times 16 \div 55 =$	52.1 lb. oxygen
Fe. to FeO	$396.5 \times 16 \div 56 =$	113.3 lb. oxygen
Total required		2,996.5 lb. oxygen

Weight of Air Required.—This item is not of necessity to the solution of the problem, but may be of interest to some readers. Air contains (by weight) 10 parts nitrogen and 3 parts oxygen, hence:

$$2996.5 \div 3 \times 10 = 9988.3 \text{ lb. } N_2 \text{ required.}$$

then the weight of the air is

$$9988.3 + 2996.5 = 12{,}984.8 \text{ lb.}$$

At standard conditions (0 deg. C. and 760 mm. pressure) 1 cu. ft. of dry air weighs 1.293 oz.; then the volume of the air is

$$\frac{12984.8 \times 16}{1.293} = 160{,}680 \text{ cu. ft.}$$

Volume of the Gases.—The carbon in 1 cu. ft. of gas is calculated to be:

One cu. ft. of $CO_2 = 1.98$ oz. then $0.05 \times 1.98 = 0.0990$ oz. is the weight of CO_2 in 1 cu. ft. gas, and $0.0990 \times 12 \div 44 = 0.027$ oz. C. from CO_2 in 1 cu. ft. of gas.

One cu. ft. of CO weighs 1.26 oz. then $0.20 \times 1.26 = 0.2520$ oz. is the weight of CO in 1 cu. ft. gas, and $0.2520 \times 12 \div 28 = 0.108$ oz. C. from CO in 1 cu. ft. of gas.

And the total weight of carbon in 1 cu. ft. of gas is

$$0.108 + 0.027 = 0.1350 \text{ oz.}$$

From that the total volume of the gases is

$$\frac{1183 \times 16}{.1350} = 140{,}207 \text{ cu. ft.}$$

Let us now change over to French units so that we may use the kilogram-calorie—a unit of heat in the metric system. In this system, the unit of volume in this work, is 1 cu. m., and is equal to 35.31 cu. ft. The volume of the gases in cu. meters is

$$140{,}207 \div 35.31 = 3970.7 \text{ cu. meters.}$$

Then:

Vol. of N_2	$3{,}970.7 \times 0.736 =$	2,922.43 cu. meters
Vol. of CO_2	$3{,}970.7 \times 0.050 =$	198.54 cu. meters
Vol. of CO	$3{,}970.7 \times 0.200 =$	794.14 cu. meters
Vol. of H_2	$3{,}970.7 \times 0.014 =$	55.59 cu. meters

These gases pass off at the same or slightly less temperature than that of the bath. The temperature of the hot metal charged is from 1200 deg. C. to 1300 deg. C., and the temperature of the blown metal is about 1800 deg. C. at the end of the blow. So the average temperature of the gases ought to be about 1500 deg. C.

Heat in the Gases.—The sensible heat in CO, N_2 and H_2 is regarded as follows: When a gas is heated it will absorb a certain amount of sensible heat which can be calculated by the formula:

$$Q = \text{Vol.} \times \text{Mean specific heat} \times \text{Temperature.}$$

If the temperature is given in centigrade degrees, and the volume in cubic meters, then the value of Q will be given in kilogram-calories. And when the mean specific heat of the gas is known the value of Q can be found.

The mean specific heat for the above three gases is $0.303 + 0.000037t$ deg. The total volume of the three gases is 3772.16 cu. m., and the temperature is taken at 1500 deg. C. Then:

$$\begin{aligned} Q &= 3{,}772.16 \times (.303[1500] + .000037[1500^2]) \\ &= 3{,}772.16 \times (454.5 + 83.25) \\ &= 3{,}772.16 \times 537.75 \\ &= 2{,}028{,}479 \text{ kg. cal.} \end{aligned}$$

The sensible heat in CO_2 is calculated as follows: The mean specific heat of CO_2 is $0.37 + 0.00027t$ deg. The volume of CO_2 is 198.54 cu. m., and the temperature is taken at 1500 deg. C. Then:

$$\begin{aligned} Q &= 198.54 \times (.37[1500] + .00027[1500^2]) \\ &= 198.54 \times (555 + 607.5) \\ &= 198.54 \times (1162.5) \\ &= 230{,}802 \text{ kg. cals.} \end{aligned}$$

When CO passes out of the nose of the converter a further combustion takes place; CO burns to CO_2, setting free an additional heat equal to the heat of combustion of CO to CO_2, which is 3062 kg. cals per cu. m. of CO. Therefore the total heat evolved by this combustion is $794.14 \times 3062 = 2{,}431{,}656.7$ kg. cals.

Total Heat Available.—The total heat available is the sum of the sensible heats of the gases, and the heat of combustion of CO gas, and is equal to 4,690,938.4 kg. cals.

Thermo Mechanical Equivalent.—The thermal equivalent of one horsepower hour = 631 kg. cal. Hence the thermo mechanical equivalent of the total heat available is $4{,}690{,}938.4 \div 631 = 7434$ h.p.h.

Transforming this into electrical energy, we have 1 h.p.h. = 746 watt hours. Then $7434 \times 746 = 554{,}574$ watt hours, or 5546 kw.h. If 1 kw.h. is worth 5c., then this energy transformed would be worth $5546 \times .05 =$ $277.30. The weight of the heat of steel was about 12 tons. So that per ton of ingots the value would be

$$277.30 \div 12 = \$23.10$$

Therefore if all of the heat that is carried out of the nose of the converter by the escaping gases from one charge could be transformed into electrical energy and sold at 5c. per kw. h., steel ingots would immediately become a by-product of an electric power plant. But that is theory. In practice, we know that attaining a thermo mechanical efficiency of about 10 per cent., would be enough upon which to congratulate ourselves.

To the writer's knowledge, no attempt has ever been made to utilize this heat. But a little thought on the career of the Bessemer process may serve to show reason for such neglect. When Sir Henry Bessemer discovered and established his process of making steel, he revolutionized the steel industry of the world. Rolling mills at once became unable to handle the large amount of steel that could be made in one heat and they had to be developed as the Bessemer process developed. When all was adjusted to speedy operation the railroads piled up the orders for rails; the cry for tonnage went up and the Bessemer process reigned supreme in the steel industry.

But close on the heels of the Bessemer came the open-hearth process which had its loyal advocates and supporters from the beginning. This process also developed and grew and to such a degree that it has outdone the Bessemer process in both quality and quantity of steel. It now stands as the leading process while the Bessemer mills are no longer being built and the process is even in danger of becoming a dying art. This tremendous development took place in less than fifty years and demanded all the thought and attention that could be commanded.

Now other phases of the steel industry are due for more attention and this question of wasted heat in the Bessemer process is surely worthy of consideration; for, if any degree of success should be attained, it would mean a reduction in the cost of producing ingot steel amounting to at least $2 per ton. This would certainly be appreciable and might be the means of placing the Bessemer process back to prestige in the production of certain grades of steel.

Final papers have passed conveying all assets, real and personal, of the bankrupt Magee Furnace Company of Boston and Chelsea, Mass., to parties represented by Robert L. Walker Company, Providence, R. I., and Alfred E. Stockbridge, Somerville, Mass., the new concern in interest to be known as the Magee Furnace Company, Inc. The sale places in the hands of the trustees funds for later liquidation of the liabilities at what would appear to be a very high figure. A. E. Stockbridge is general manager of the new company, which will fill all orders promptly.

NEW YALE & TOWNE OFFICERS

H. R. Towne Becomes Chairman of Board and W. C. Allen President of the Company

Henry R. Towne has retired as president of the Yale & Towne Mfg. Company, a position which he held for 46 years, and has been elected chairman of the board of directors, an office recently created. In his new relation to the company Mr. Towne will be available for counsel with its executive officers, yet will not be obliged to give to its current affairs constant and close attention as heretofore.

To fill the vacancy created by Mr. Towne's partial retirement from the activities of the company, the directors have elected as president Walter C. Allen, who as vice-president and general manager has been practically responsible for the management and direction, under the president, of the company's commercial affairs and general business. In his new position Mr. Allen will continue to act as general manager.

HENRY R. TOWNE

WALTER C. ALLEN

Mr. Allen's career with the Yale & Towne Mfg. Company exemplifies Mr. Towne's belief in young men, and his policy of filling all important positions by promotion, if possible. It also affords an example of the progression, step by step, from a humble position to one at the top, which is possible where a young man resolves to know thoroughly the business he engages in, is willing to work and study, and adheres to his resolves. Mr. Allen, who is 38 years old, was born in Farmington, Conn. As any other boy might have done, he entered the employ of his company 23 years ago as a truck-boy in the stock-room. He served two years in the office and then devoted three years to learning the trade of tool-making. He next went into the drawing-room where he served three years. He was then selected as an assistant by the late Frederick T. Towne, general superintendent. He was next made assistant general superintendent and when Mr. Towne died he was made general superintendent in charge of the company's factory. In 1909 Mr. Allen came to New York as general manager in charge of selling and advertising and in 1914 he was elected a vice-president of the company. He regards himself as particularly fortunate in the training he received under F. T. Towne and in the attitude of Henry R. Towne, already referred to.

Mr. Towne has served the Yale & Towne Mfg. Company as its president since the death of its first president, Linus Yale, Jr., shortly after the formation of the company. When he signified his desire to retire from the duties and responsibilities he had so long carried, the by-laws of the company were amended to create the position of chairman of the board. Mr. Towne's career as a manufacturer and his many activities in public and business affairs are too well known to require comment here.

Schuyler Merritt, senior vice-president (who is also the president of the Stamford National Bank), will continue to hold that position and to give his special attention to the company's patent affairs, and to the general direction of the bank lock department. He has been in the company's service for 37 years, is intimately familiar with its history and affairs, and is qualified by long experience and ripe judgment to advise and assist his junior associates.

J. H. Towne will continue to serve the company as its secretary. He entered its service some 24 years ago, and has had experience in every part of its commercial work. In addition to the duties of his office, he supervises the business of the cabinet lock and specialty department, and is constantly consulted concerning the commercial affairs and policy of the company.

John B. Milliken, treasurer, wlil continue in that position, which he has held for the past four years.

Joseph A. Horne will continue as general superintendent of the works. Entering the company's service as a skilled mechanic some 23 years ago, he has risen, like Mr. Allen, from the ranks to his present position by successive promotions, and likewise had the benefit of long association with the late F. T. Towne.

The executive management of the company thus remains substantially as before, and the retirement of Henry R. Towne from active participation will make no change, either in the policy of the company or the methods of conducting its business.

At a meeting, March 11, 1915, the stockholders, upon the recommendation of the directors, authorized the issue of 5000 additional shares of capital stock, or $500,000, substantially all of them waiving their rights of subscription thereto in order that the directors might arrange for its acquisition, in proper proportions and on equitable terms (at not less than par), by those of the officers and employees on whom will rest the chief responsibility for the further development and continued success of the business. In this way there will be assured in the future that identity of the personal interests of those responsible for the management of the business with the interests of the corporation which in the past has been so large and useful a factor in stimulating the activities of the executive officers and in promoting the growth and prosperity of the company.

At the beginning of Mr. Towne's presidency, the number of employees was less than one hundred. In recent years the number has been increasd to over 5000, and during the same period the capital employed in the business has increased from less than $100,000 to over $10,000,000.

The executive and general offices of the company are located at 9 East Fortieth street, New York City, in the building erected and owned by the company for its own use. Branch houses are maintained in Chicago and San Francisco, and also, for the conduct of the European business, in London, Hamburg and Paris. The Canadian business is conducted through a subsidiary corporation, Canadian Yale & Towne, Ltd., St. Catharines, Ontario, in a new plant erected in 1912-1913.

Report of La Belle Iron Works

The annual report for the year ended December 31, 1914, of the LaBelle Iron Works, Steubenville, Ohio, was issued last week. In line with the experience of other steel companies, the report shows a heavy decrease in earnings. The deficit for the year was $470,410.39. Following is a statement of the income account:

Net earnings from operations after deducting charges for maintenance and repairs, approximately $636,200		$588,811.86
Less provision for the exhaustion of minerals and extinguishment of lease values		209,898.92
Profits for the year		$378,912.94
Deduct:		
Interest on first mortgage bonds	$105,668.33	
Cash dividends on capital stock	743,655.00	
		849,323.33
Deficit for the year		$470,410.39
Surplus at December 31, 1913		3,245,470.33
Net surplus carried to balance sheet		$2,775,059.94

The balance sheet, as of December 31, 1914, is as follows:

Assets

Real estate, buildings, equipment, etc., also mining and gas and oil properties	$21,935,738.21
Investments at cost	198,411.87
Cash held for the redemption of matured bonds	8,000.00
Inventories of manufactured products, materials and supplies at cost	3,862,807.96
Accounts and bills receivable	589,244.14
Cash	435,535.54
Deferred charges to future operations	38,232.89
Total	$27,067,970.61

Liabilities

Common stock issued	$9,915,400.00
Preferred stock issued	9,915,400.00
First mortgage bonds	1,680,000.00
Accounts payable	145,206.64
Wages, taxes and royalties accrued	174,135.64
Bond interest accrued and coupons not presented for payment	12,425.00
Dividends unpaid	140.00
Reserves:	
For general depreciation	1,402,318.48
For exhaustion of minerals	886,455.35
For relining furnaces and extraordinary repairs	161,429.56
Surplus December 31, 1914	2,775,059.94
Total	$27,067,970.61

Pickling and the Corrosion of Sheets

In testing the corrosion of sheet iron, the selection of a number of methods of cleaning the surfaces is important. The literature of the corrosion of iron and steel deals but little with this point, not much attention having been given to the best means of eliminating the effects of scale and in particular to the effect produced when this scale is removed by pickling. In an article by E. A. Richardson in Metallurgical and Chemical Engineering, on "Effects of Pickling upon the Corrosion of Iron," it is shown that pickling exerts a great influence on the rate of corrosion and that tests in which this effect is not eliminated are not comparable and may even be unreliable and misleading. This conclusion is based on the results of a test made on four kinds of commercial sheet irons. The main points are as follows:

In order that the samples might be comparable before pickling, they were annealed in a muffle furnace at the same time at a temperature of 750 deg. C. and cooled slowly. They were then pickled as follows:

1. Scale removed by grinding on an emery wheel.
2. Scale removed by pickling in sulphuric acid.
3. Scale removed by pickling in sulphuric acid, and the samples washed in water and dipped in dilute nitric acid.
4. Scale removed with sulphuric acid and the samples washed with water and dipped in a mixture of ammonia water and hydrogen peroxide.

After pickling, the test pieces were washed thoroughly with water and dried by dipping in alcohol. They were then measured and weighed and exposed to the weather in a wooden rack from October 1 to January 1. The four materials used analyzed as follows:

Sample	Sulphur, per cent.	Phosphorus, per cent.	Carbon, per cent.	Manganese, per cent.	Copper per cent.
a	0.020	0.003	0.01	0.052	0.048
b	0.059	0.117	0.10	0.319	0.268
c	0.045	0.094	0.10	0.406	Trace
d	0.051	0.009	0.035	0.044	0.044

It was noticed at once that the method of pickling had a decided influence upon the starting of corrosion. The samples which had been dipped in nitric acid were the last to start rusting; in fact they were rained upon several times before any signs of rusting appeared. The others started to rust after the first rain. The duration of this test was 95 days, after which the samples were examined before removing from the rack, the examination being made by three independent observers. All three agreed to the same classification, which was as follows:

First. Sample "b." This material was by far the best. The rust was red in color and adherent and was smooth and fine grained.

Second and Third. Samples "a" and "d." These materials were corroded about equally. The rust was coarse-grained and was becoming loose.

Fourth. Sample "c." This material was much the worst. The rust was yellow in color, was coarse-grained and very loose.

After cleaning the surface of the samples with neutral ammonium citrate solution, the same three observers again observed them. The results were as before. After these inspections the samples were reweighed and the loss in weight computed in grains per square centimeter. The results are as follows, each figure being an average of two:

Losses by Different Methods of Cleaning the Surface

Sample	Grinding	Sulphuric acid	Sulphuric and nitric acids	Sulphuric acid and ammonia and peroxide
b	0.0372	0.0420	0.0293	0.0389
a	0.0597	0.0600	0.0441	0.0512
d	0.0651	0.0463	0.0497	0.0476
c	0.0952	0.0967	0.0646	0.0864

From an examination of the above figures it is evident that the method of cleaning the surface of test pieces before exposure has a decided influence upon the rate of corrosion. This is particularly noticeable when a passifying agent such as nitric acid is used. Upon long exposure tests this effect would undoubtedly be decreased and might perhaps be eliminated.

Conclusions From Steel Rail Research

Failures Result from Internal Flaws Rather Than Wheel Pressures—Rail Makers Improve Methods of Removing Surface Defects

The report on rails which the American Railway Engineering Association is receiving this week at its sixteenth annual convention at Chicago covers the work of the committee on the following assignments:

1. Recommend standard rail sections.
2. Continue investigations of rail failures and deduce conclusions therefrom.
3. Continue special investigation of rails.
4. Present specifications for material in rail joints.

Of special interest have been the investigations of rail failures as reported from time to time by M. H. Wickhorst, engineer of tests for the committee. The conclusions drawn from this work in the past few years are summarized in the present committee's annual report. The knowledge of the causes of rail failures has become much more definite and reliable. Matters that were considered of great importance a few years ago are now seen to be minor considerations, and important factors in causing rail failures were recognized only vaguely, if at all. It has been found that most of the rail failures may be divided into four classes, as follows:

1. Crushed and split heads.
2. Broken rails (square and angular breaks).
3. Broken bases (crescent breaks).
4. Transverse fissure (oval spots in rail head).

CRUSHED AND SPLIT HEADS

With some condensation the conclusions of the committee are given below:

Crushed and split heads are to be attributed to the interior condition of the ingot from which the rail was rolled, known as segregation, and its attendant conditions of sponginess. Segregation is an excessive concentration of carbon, phosphorus and sulphur in the interior and upper part of the ingot, and is to be avoided by obtaining well-deoxidized, quiet-setting steel, and by avoiding the use of ingots with "horny" tops. Split heads were frequently attributed to pipes, but these occur mostly in the web, and it is probable that true pipes cause in themselves only a small part of the rail failures. Again, high finishing temperature was blamed for head failures, as well as for broken rails in general, and while investigations have shown that the finishing temperature has some influence on the properties of the metal, it is probable that but few rail failures can be charged to high finishing temperature. It has also been argued that the head should be made deeper, but this also seems of doubtful value. Under rolling wheels, the top of the head spreads sideways, and if the interior metal is unable to extend transversely in like degree, on account of excessive segregation, laminations or other condition, it develops a crack which grows and finally results in a split head. Most of the side spread occurs in the upper half inch of the head, and it would seem that an increased thickness of head would add but little to the resistance of the rail against this type of failure. The remedy is to avoid excessive segregation, which can be done by using well-deoxidized steel, treated with suitable amounts of silicon, titanium or aluminum.

Deoxidizers keep the segregation down to a low amount, but when the steel is cast into ordinary iron molds the ingots then contain large and deep pipes, which also can be found in the rails lower down from the top end of the bar, than in steel not so well deoxidized. It would seem, then, that a large discard will have to be made, or some "sink-head" or "liquid-top" process of making the ingot will have to be used. The latter has lately been used to a small extent for rails, and probably the future will see a development of the process commercially available for rails, so that full advantage may be taken of low-segregating steel.

BROKEN RAILS AND BASES

Broken rails and broken bases have their origin in longitudinal seams in the bottom of the base. Where a seam occurs, away from the center of the base, only a piece of flange may break out and a crescent break results, but if the seam is near the center, under the web, the flange starts to break and the fracture follows through the whole section, and a "broken" rail results. This explanation of the cause of such failures was practically unrecognized in a general way among railroad men, but recently the steel mills have been giving considerable attention to the matter of keeping rails free from dangerous seams in the base. Within the last year the Lackawanna Steel Company has developed its de-seaming process [described in *The Iron Age*, December 10, 1914], which consists of hot-milling the rail-bar before it is fully shaped, and removing the seamy surface. The National Tube Company has also recently developed at Lorain, Ohio, a process for rolling ingots in V-rolls, for the purpose of supporting the four sides of the ingot in the early passes of rolling in order to avoid tearing open the sides.

In addition to the matter of seams, the question of transverse ductility also enters, and a method of making a transverse test of the base, including its strength and transverse ductility has been devised. The indications are that the larger seams start from crosswise cracks in the surface of the ingot, which are further opened up as zigzag gaps in the early blooming passes. The succeeding passes close in the sides of the gaps and form them into seams. The early blooming passes need considerable study, with special reference to the question of avoiding seams and improving the transverse ductility of the metal. The thickening of the base and also the increase of the fillet between web and base, strengthen the rail against failure as broken rail or broken base, but this can be only a partial solution, as any crack would be apt to grow till failure results. Considerable investigation of the process of rolling the bloom is now needed, and perhaps, also, of casting the ingot, to avoid surface cracks and other surface imperfections.

CAUSES OF FISSURES

The cause of transverse and other internal fissures in the head of the rail has proved a very puzzling and baffling question, but within the last year information has been developed that promises, when fully worked out, to be useful in avoiding such failures. Rails that have failed, due to transverse fissures, have been found to contain numerous small cracks or fissures in the interior of the head

of the rail, which were mostly longitudinal, but partly transverse. Very recent work indicates that new rails may have such small cracks in the interior of the head. The explanation for the failures that now seems most probable is that transverse fissures show a nucleus, which was probably a small crack in the original rail, and, being perpendicular to the longitudinal stresses in the rail head, the crack kept growing until failure occurred. What conditions of rolling produce these internal cracks are still matters for further experiment and investigation.

CHANGES IN RAIL SPECIFICATIONS

With respect to rail specifications, the most recent omit the sliding scale of carbon corresponding to the phosphorus content and allow no increase of carbon for low phosphorus. The type of rail failure known as "transverse fissure" seemed to occur most frequently in rails containing over 0.80 per cent. carbon, and for the present the maximum carbon limit will be kept below this amount in rails covered by the specifications, namely, 100 lb. per yard and under. The maximum carbon in open-hearth rails was placed at 0.75 per cent.

A most important development in rail specifications in the past few years has been in the requirements of the drop test. The hight of drop has remained much the same, but a ductility requirement has been introduced by which a measurement is made of the stretch of the part in tension. It was customary to test the rail with the base in tension, but the more usual practice now is to test the rail with the head in tension, as this more effectively determines the interior condition of the metal, particularly as regards segregation. It had been usual to test a piece of rail representing the top part of the ingot, and this is still the practice. In the 1908 specifications breakage of this piece rejected the whole heat, but a change was introduced, which is also the present practice, by which only the "A" or top rails are rejected, and test is made of one or more "B" rails to represent the lower rails. If this fails, the "B" rails are rejected and a test is made of one or more "C" rails. If this breaks, all the rails of the heat are rejected. The question of testing each ingot has been under discussion at different times, but has not been embodied into specifications generally.

Beverly, Mass., Industrial Training School

An interesting example of a public school based upon co-operation between the employer and the school is the Beverly, Mass., Industrial School. This school was established by the city in 1909. The only industry up to the present time that has entered into co-operation with the school is the United Shoe Machinery Company. The company furnishes a shop in its own plant equipped with tools for training in the machinist's trade. The company furnishes the raw material, which it sells to the school as to an outside concern. The company then purchases at established prices all finished product which meets the required standard. If the earnings of the school-shop fall below the cost of maintenance the deficit is made up by the company.

The city of Beverly provides a school building, salaries of the director and instructors on duty at the school building, and items of maintenance not included above. The funds for this are raised in the same manner as the funds for the regular schools of the city.

Pupils alternate weekly between the shop and the school-room. While in the shop they are paid on a piece rate basis for all work passed by the company inspector. The significance of the school for industrial education lies in the spirit in which a great industry has joined hands with the public school and accepted the responsibility for its share in the training of the worker for industrial efficiency and citizenship. It points the way to what industry everywhere must do before we can reach in any large sense a solution of the problem of industrial training. Because of this peculiar significance the United States Bureau of Labor Statistics, through the courtesy and co-operation of the United Shoe Machinery Company and the State Board of Education of Massachusetts, secured a motion-picture of this school to be used as a part of the bureau's exhibit of industrial training at the Panama-Pacific International Exposition.

The foregoing notes are taken from a paper devoted to "The New Apprenticeship," by Wesley A. O'Leary, United States Bureau of Labor Statistics.

Production of Large Steel Castings by the Baby Bessemer

It is quite customary to make occasional large castings in steel foundries having small converters, by uniting several heats, the first blown heats being held in the ladle under a covering of slag until the required weight is reached. A whole series of heats can be successfully united if a mixer or collector of proper construction is used that is well pre-heated. This method is in operation at the Fonderia Milanesia di Acciaio at Milan, Italy, according to Stahl und Eisen. In 1894 several castings up to 6 tons in weight were made, a mixer being used, and since then the weight has been increased to 25 tons, a larger mixer having been built. Experience has shown that the quality of the steel is greatly improved due to its long holding. Purification takes place similar to that noticed in the case of pig-iron mixers. The manganese is lowered 25 per cent. and the phosphorus 15 per cent. Also the non-metallic impurities are removed, though this is not shown by chemical analysis.

The temperature of the steel at this point is determined in a very simple way. A round bar 12 mm. in diameter is held in the bath and the time noted in seconds that it takes to dissolve. Ten to 25 seconds is a suitable time, varying with the size and thickness of the castings to be made.

Recently castings of 30 tons have been made, weighing 45 tons with the casting heads, and a brief description of the method may be given. More steel than this must be made, due to a possible skulling in the mixers during the long wait. The steel making capacity consists of three 1-ton converters, two open-hearth furnaces of 3 to 4 tons, one open-hearth furnace of 6 tons (at the most 8 tons), and a Stassano electric furnace holding about 1 ton. Only one converter can be blown at a time, due to insufficient blast, so that as fast as one is turned down another is turned up. Also only two open hearths can be run together. There are two mixers, one holding 15 and the other 20 tons.

The converters were blown for four hours and in that time made 40 tons; one open-hearth furnace 8 tons, another 5 tons and the electric furnace 1 ton, altogether 53 tons. This large excess of 8 tons was to counterbalance skulls in the mixers, which amounted to 6 tons. The steel, nevertheless, cast all right. The experience gained with this first large casting was used several weeks later when a second was made; 34 tons of steel was blown and 4 and 7 tons respectively were obtained from two open-hearth furnaces. No skull was left in the mixers. The cupola charge for the converters consisted of 50 per cent. hematite with 4 per cent. silicon and 50 per cent. steel scrap with 0.2 per cent. silicon. The heads and risers were cut off with oxy-acetylene, and the castings annealed by building a furnace around them in which a coke fire was used.

G. B. W.

Power Gas Economy, Ltd., 324 Diamond street, Pittsburgh, of which Kurt Huessener is manager, has secured a number of contracts in the first month of Mr. Huessener's activity in this country. These include the equipment of boilers for the following companies: Pittsburgh Steel Company, Monessen, Pa., 17 500-hp boilers; Upson Nut Company, Cleveland, 17 50-hp boilers; Inland Steel Company, Indiana Harbor, Ind., equipment of one trial boiler.

RAILROADS CANNOT EQUALIZE

Not Permitted to Adjust Freight Rates so as to Help Localities

WASHINGTON, D. C., March 16, 1915.—Advantages which iron and steel plants or other consumers of coal or other commodities possess for the delivery to them of raw materials by reason of their location on navigable waters may not be nullified by common carriers through the manipulation of freight rates with the object of equalizing the costs of competing manufacturers whose plants are less favorably located. This important principle is laid down in a report just completed by the Interstate Commerce Commission upon an investigation of certain railroad tariffs recently suspended on the complaint of the Camden Iron Works, Florence Iron Works and Esterbrook Steel Pen Works, Camden, N. J.; E. I. duPont de Nemours Powder Company, Wilmington, Del.; Pittsburgh Coal Company, Pittsburgh, and other corporations, the defendant carriers including the Pennsylvania, Baltimore & Ohio, Philadelphia & Reading and the New York Central railroads.

COAL RATES THE CAUSE OF ACTION

The tariffs under investigation provided increased rates for the transportation of bituminous coal from mines in Pennsylvania, Maryland, and West Virginia to Philadelphia, Wilmington and Baltimore, for transshipment to points inside the capes of the Delaware and Chesapeake bays. The present rates on coal delivered over the piers at Philadelphia, Wilmington or Baltimore for transshipment to points inside the capes are 25c. per gross ton less than the rates on coal for track delivery to industries or coal yards located in these cities. The rates to Philadelphia on coal for transshipment to points outside the capes are 35c. less and to Baltimore 42c. less than the rates for track delivery at those points. The differential of 25c. between the "track-delivery" rates and the "inside-the-capes" rates has been maintained since April 1, 1909. Prior to that date, as far back as April 1, 1905, the differential was 30c. In the suspended tariffs the difference between the track-delivery rates and the inside-the-capes rates is narrowed to 18c. by increasing the latter 7c. per gross ton. To a large number of coal dealers and industries at Philadelphia, Wilmington, and Baltimore coal can be delivered only over the tracks of railroads leading to their yards or plants. Others are located on navigable waters and receive their coal over the piers, whence it is transported to their yards or plants by means of barges or lighters. Some can receive coal both by track delivery and by water.

The immediate cause of the proposed increase in the rates on coal delivered over the piers for transshipment to points within the capes, the carriers assert, were the complaints of two coal dealers situated at Baltimore who receive their coal by track delivery. In letters to the carriers and on informal complaints to the commission, they alleged among other things that the lower pier delivery rates are unjustly discriminatory, and give undue preference to their competitors. The carriers further assert that the inside-the-capes rates are forced by carrier competition and are made lower than the track-delivery rates in order that carriers may reach by water industries located on the lines of their competitors. To do this they have shrunk their inside-the-capes rates by the amount of the cost of boat service and discharge, thereby enabling the consignee of coal transshipped over the piers at Philadelphia, Wilmington, and Baltimore to obtain it at the same total transportation charge as the consignee of all-rail coal. Owing to a decrease in the cost of boat service and discharge the present inside-the-capes rates are claimed by the carriers to be unjustly discriminatory against consignees taking coal all-rail, and to remove this discrimination the suspended tariffs were filed. In the carriers' opinion the present differential of 25c. materially exceeds, while the proposed differential equals, the average cost of boat freight and discharge. The carriers also argue that the track-delivery rates are reasonable in that they compare favorably with rates on coal to other Eastern points for like distance and that the proposed inside-the-capes rates are also reasonable because of the fact that they are arrived at by deducting 18c per ton from the track-delivery rates.

CLAIMS OF THE PROTESTING MANUFACTURERS

The manufacturers protesting against the proposed tariffs argue that the essential question in this case is whether or not the increased inside-the-capes rates are just and reasonable per se, irrespective of their relation to the track-delivery rates, and not, as the carriers contend, whether or not the proposed differential fairly represents the average cost of boat service and discharge. If the present differential should be found to effect an unjust discrimination, protestants contend that it could be removed by decreasing the track-delivery rates as well as by increasing the inside-the-capes rates, and attention is called to the fact that respondents have made no attempt to justify the increased rates by applying the usual tests. The significant fact is also pointed out that the inside-the-capes rates on anthracite coal have not been increased, showing that there is no justification for the proposed increases on bituminous coal. Both kinds of coal pass over the same piers and require exactly the same service.

In considering the issues, the report of the commission states that "it is plain that respondents' reasoning leads to the conclusion that the charge for transporting coal for delivery over the piers for transshipment to points within the capes must either be high enough so that a consignee by water will in no case receive his coal at a total charge less than the track-delivery rate, or else a different rate must be published for each consignee at points within the capes dependent upon his particular cost of boat service and discharge." In case the second alternative were adopted, the commission declares, the carriers would absorb whatever saving a consignee might effect by the installation of improved plants for unloading water-borne coal and the consignee who unloaded his coal from barges by wheelbarrow would receive it at no greater cost than the consignee equipped with facilities for unloading coal with the least possible expense. In the case of the Pittsburgh Steel Company the carriers attempted to justify discriminatory rates on the ground that they represented an attempt to equalize the freight costs of assembling the raw materials, iron ore, coke and limestone, entering into the production of pig iron at the different plants, but this defense was overruled by the commission, which declared that the equalization of freight costs was not a function of carriers. In conclusion the commission says:

> The advantage of the cheaper movement to the piers should be safeguarded to consignees who receive their coal in that manner. Moreover, since the rates under consideration apply on coal for transshipment by water it is of especial importance that in determining their reasonableness full consideration be given not only to the cost of delivery at the piers as compared with the cost of track delivery, but also to the cost of the entire service from the mines to the piers. For if the rail carriers be permitted to establish their rates in connection with water carriers upon a basis which will equalize shippers at various points along the waterway, they will absorb the benefit which should accrue to the public of the lower cost of water transportation. From what has been said it is evident that respondents have not only fallen into the error of attempting to defend a change in the differential resulting from increases in rates, the reasonableness per se of which is the question at issue, but also have based their defense upon a theory for arriving at a proper differential which from every point of view is untenable. Respondents have failed to meet the burden of proof which the statute places upon them to show that the proposed increased rates are just and reasonable.

In line with this decision an order will be entered by the commission requiring the carriers to cancel the tariffs under suspension and to maintain the present within-the-capes rates to the points in question.

W. L. C.

Germany's Control of the French and Belgian Steel Industries

At a meeting of the Association of German Ironmasters in Dusseldorf, January 30 and 31, Dr. Emil Schrödter, secretary of the association and an honorary member of the Iron and Steel Institute, read a paper on "The Iron Industry During the War." Dr. Schrödter had spent considerable time at the army's main headquarters in the field and his paper gave the following first-hand details of the war's effect on the French and Belgian steel industry:

In France Germany now holds parts of ten departments, covering an area of about 5,250,000 acres with a population of 3,255,000. This means a German control of 68.8 per cent. of the coal output of France; 78.3 per cent. of the coke output; 90 per cent. of the iron ore; 85.7 per cent. of the pig iron output; 76 per cent. of the raw materials, including 95.3 per cent. of the basic Bessemer steel and 76.9 per cent. of the steel castings, and the entire output of tubes. British supplies of coal are inadequate and the cost is about $4.62 more per ton than in France. All but one of the French locomotive and railroad car plants are in German hands. For wrought tubes the French will have to rely on British and American supplies. Practically all of the French iron-ore mines are in territory occupied by Germany.

Out of 170 French blast furnaces, 95 of the 127 in blast when the war broke out are in the war zone. Because of ore scarcity only 30 of those still in French hands are able to run, and many of these are small. Hence 80 per cent. of the total French blast-furnace capacity is out of commission. Of the French steel plants 70 per cent. are in German hands. Steel plants uninjured are largely idle. At the horse-shoe works at Valenciennes enormous stocks were found and appropriated by the Germans. Summing up as to France Dr. Schrödter said: "While we on the German side are able to draw upon enemy stocks, the French army is deprived of the greatest part of its manufacturing resources and has to get its material from foreign countries. Hence France has already been so severely hit as to cripple and partly destroy her economic power."

As to Belgium, the steel industry there has been almost entirely crippled. Belgium bought iron ore abroad and exported about 75 per cent. of its steel output. Prospects of a revival of this industry are not immediate, says Dr. Schrödter, though the Germans are making every effort to that end. Belgium's coal output is now about 55 per cent. of normal.

German Machinery Trade in War Time

A report of considerable importance has been issued by the German Association of Machine Construction Works in regard to the position of the trade under war conditions. Information was furnished by the more than 200 members, many of whom in recent years have undertaken a large export business. At the outbreak of the war machine building in common with all industries was affected by a withdrawal of labor, railroad stagnation and hesitation of buyers. Consignments to enemies were stopped and some successfully returned. When traffic was resumed, machinery producers again began deliveries and even in August these were about one-third of normal. In September machinery shipments reached two-thirds of the usual amount and later months have probably shown an increase.

Export trade in machinery, usually three-tenths to one-third of the total, was of course largely reduced. In the German market some of the leading machinery buyers of repute could not meet payments early in the war. Improvement did not set in until late August, after Governmental and other announcements of the legal position. In that trying period the banks, especially provincial branches of the large Berlin banks, did not come to the assistance of manufacturing firms in the way that was to be expected.

Accounts in hostile countries are not collectible, and the moratoria in neutral countries were taken advantage of in postponing remittances. Where the machinery is still in Germany and customers are anxiously awaiting its delivery, these have agreed to new conditions, including shorter terms and mostly payment against documents, the customers also assuming shipping risks.

The scarcity of non-ferrous metals is touched upon. Machinery manufacturers were not at first very much affected by the shortage, having stocks on hand, the contractors also holding supplies of finished sections, etc. Difficulties arose later, for these metallic parts though small are indispensable to delivery. It is stated that the amount of copper and other metals recently released is scarcely sufficient to cover requirements in the long run, and consequently machinery makers are substituting iron or steel parts wherever possible for the non-ferrous parts, in order to execute orders. Existing orders are reported as enough to keep plants busy for a number of months, allowing for the large number of men called to the army.

German Iron and Metal Trades

Scarcity of iron ore and pig iron in the Siegen, Westphalia, district is unprecedented, and substitutes for the workmen called out are very hard to secure. It is even proposed to employ war prisoners at mines and furnaces. Demand for pig iron from foundries on war contracts continues and the Pig Iron Syndicate has ceased selling for delivery in the first quarter, and is expected to advance its quotations for hematite and No. 1 foundry iron for the second quarter. Lorraine and Luxemburg iron has advanced decidedly and iron produced by small outside furnaces has been sold as high as $21.90 to $24.33 per ton. Ingots are $20.69 to $21.90 at the mill. The recent advance of $2.43 in thick plates has caused medium plates to be quoted at $30.42 and thin plates at $31.63 to $32.85 per metric ton. Bar iron is $29.20.

Basic steel bars in general are selling at $27.37 for first quarter with active business booked for the second quarter at an advance of 61c. Prices in some cases reach even $27.98 to $28.71. It is expected that the bar association will quote $29.20 for the second quarter, due to higher cost of production. Good export business to neutral countries is reported.

Tubes have been advanced by a reduction in domestic discount rates, resulting in a rise of $2.43 to $7.30 per ton, making a total advance of up to $14.60 per ton as compared with the situation a month ago. But large boiler tubes have been reduced by raising the discount from 1 to 1½ per cent. Good progress is reported toward the formation of a tube syndicate.

A recent meeting of wire manufacturers fixed prices of drawn wire at $31.63, of wire nails at $34.06 and galvanized wire at $40.15.

The next meeting of the Steel Syndicate is expected to advance the price of semi-finished steel $1.22 per ton. Shapes are not likely to be advanced.

In Upper Silesia military orders are abundant, but merchants' requirements are slack. Labor is scarce and the full capacity of plants cannot be utilized. Prices have advanced with those of iron ore, coal, etc. Basic steel bars stand at $26.76; hoop iron at $30.42, and iron bars at $34.06. Sheet and ship plates are in good demand with satisfactory export orders for heavy railroad material.

Prices for scrap are rising. Railroad authorities at Cassel recently sold 3500 tons of old steel and iron at $2.19 for iron rails, $3.89 for rejected steel rails and $4.38 for wrought scrap, all per 100 kg.

The Association of Steel Goods Makers at Solingen has advanced prices of saws and machine knives by 10 per cent.

Export prohibitions now include iron sheets 4.5 mm. thick, corrugated tubes with a wall thickness of 4.5 mm and over, spelter and zinc sheets and pig iron lower than 1 per cent. in phosphorus.

All stocks of copper, nickel, tin, aluminum, antimony and lead have been officially commandeered, and all holders were ordered to declare their stocks.

The German Spelter Syndicate has advanced its price $4.87 per ton for refined Upper Silesian spelter. Thousands of tons have been sold recently.

Gas and Steam Engines and the Turbine*

Comparisons of Cost of Operation, Investment and Depreciation at Blast Furnaces and Steel Works

BY J. E. JOHNSON, JR.†

Until within a few years only one type of prime mover was used at blast furnaces, steel works and rolling mills—the steam engine, but within that time the steam turbine and the gas engine have forged ahead at a tremendous pace. For a while they threatened the steam engine with extinction, as the turbine could get along with half and the gas engine with a third of the heat consumption required for fairly good engines a few years ago. There is no doubt that the steam practice at steel works and blast furnaces, particularly the latter, a few years ago was almost as bad as could be. In spite of the fact that 10 per cent. of the gas is sufficient to blow the furnace with good practice, the whole 50 per cent. not used by stoves and auxiliaries was frequently insufficient and coal had to be burnt under the boilers to help out. This condition persists even yet at many plants.

NEW STEAM ENGINE ECONOMIES

This was the condition with which the gas engine and turbine builders made comparisons and of course the showing was a bad one for the old steam engine. After a while the steam engine builders and the operators of the plants began to see that there were great possibilities in the use of that prime mover which they had neglected. One of the conditions indispensable for best economy with the turbine is super-heat. This has long been known as very beneficial to the steam engine, still no one took the trouble to develop the practice for that purpose. But after it had been developed for the turbine it was applied in earnest to the steam engine. The same thing applied to condensing practice in a less degree. The turbine is simply lost without high vacua, far higher than had ever been considered for the steam engine, and new types of condensers were developed for it, but this development showed up in high relief the absurdity of running reciprocating engines non-condensing, and the improved condensers were applied to them, with the result that no large engine plant built with regard for economy is now ever designed to run non-condensing though that practice was standard in the iron and steel business twenty years ago.

With these improvements have gone a rapid increase in boiler pressure and a general overhauling of designs, so that large steam engines can still compete on the heat economy basis with turbines of equal size. On the other hand what is large for an engine is rapidly coming to be small for a turbine. The largest power engines ever built were double compound horizontal-verticals with four cylinders which were of 8000 hp each. There were five of these in one station. A few months ago a single steam turbine was installed in that station, started up and put into the line. Then one after the other the five engines were shut down and the load of each in turn thrown on the turbine.

ADVANTAGE OF THE TURBO-GENERATOR

In electric power development the turbine has three vast advantages over the steam engine, which for large powers have enabled it to outclass the latter utterly, so that the steam engine is no longer considered for such service. The first is that the pressure of steam is converted directly into rotary motion immediately available for driving generators, whereas in the steam engine the pressure must first be converted into a reciprocating motion and that transformed through an expensive mechanism into rotary. In the second place the refinement of the engine has led to increasing complexity, and many moving parts with various motions, whereas the turbine has in effect a single moving part with the simplest possible motion, a uniform speed of rotation. This vastly reduces the supervision and upkeep of the latter as compared with the former. Third, the speed of rotation of the engine is limited by the motion of the parts to about 100 r.p.m. in large sizes, which necessitate large and very expensive generators for direct connection to it, whereas the speed of the turbine is from 1000 to 3000 r.p.m. and the corresponding generators are very much cheaper.

THE CASE OF THE BLOWING ENGINE

When we come to blowing engines, we find the relative positions of these two motors to some extent reversed. There are two systems for compressing air, the time honored one with cylinder, piston and valves which operates by direct pressure, and the multiple fan system of imparting a tremendous velocity to the air by a rapidly revolving runner and transforming this velocity into pressure by driving it through a converging nozzle. The velocity and pressure which we can obtain at one operation are limited, but by putting several such fans in series we can obtain any pressure we wish. The operation is the exact opposite of that of the turbine with the difference that where the conversion of pressure into velocity on which the turbine operates can be carried on with very high efficiency (above 95 per cent), the converse operation of converting velocity into pressure can only be carried on with an efficiency of about 70 per cent.

On the other hand, the over-all efficiency of the direct connected reciprocating blowing engine is extremely high—between 85 and 90 per cent. in good practice—so that the best designed reciprocating steam blowers under the same conditions as the turbine driven blower have a considerable advantage over the latter in steam consumption. On the other hand, the steam engine costs a little more to install than the turbo-blower, against which we may set the fact that owing to its lower steam consumption it requires less expenditure for boilers.

Great advantages are claimed for the turbo-blower for its smooth and non-pulsating discharge; on the other hand, this is claimed by others to be a positive disadvantage. The metering action of the positive piston compressor is believed by many to be a very great advantage, while on the other hand this action is claimed by the advocates of the turbo-blower not to be nearly as accurate as the volume control of their machine. You will see, therefore, that this is an extremely live question at the present time, and in some company it is scarcely

*From an address on "Modern Power Plants in the Iron Industry" delivered before the Engineering Association of the State College of Pennsylvania, March 9, 1915.

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safe to sake a positive statement on either side without first putting on a suit of armor.

ROLLING MILL SERVICE

For driving rolling mills the conditions are different from either of the others. The largest mills handling the huge ingots in their original shape are known as "blooming mills" and these, for reasons for which we need not stop to consider here, generally have to run in both directions to drive the piece back and forth through the rolls; and as these mills are geared directly to the engine it must be of the reversing type. Here the steam engine takes the first position, with no second, since it is the only prime mover which can be reversed at all, let alone at intervals of literally a second or two.

Some of these engines are triumphs of the engine builder's art and are among the most powerful built, having two pairs of tandem cylinders 46 in. and 76 in. in diameter by 60-in. stroke, running condensing with a steam pressure of 150 lb. and up to 175 revolutions. These are reversed from full speed in one direction to full speed in another in three or four seconds, in spite of the vast weight of their reciprocating parts. The shocks are such as no machine should be called on to stand, but they do it and so far no way has been developed to meet some conditions as well as this type of mill and engine, though I have hopes. For non-reversing mills direct geared turbines and gas engines have occasionally been applied, but in the vast majority of cases steam engines are used or else electric motors.

The double transformation of energy involved in the electric drive is expensive in fuel cost and what is much more important it is very expensive in first cost, and it is rather surprising that more has not been done in the designing of non-reversing mills direct geared to the gas engine, and especially to the steam turbine, since the latter has a high efficiency through a wide range of loads, or, as we say, a flat steam consumption curve, which is very important in highly intermittent work like that of rolling mills. I believe that a considerable development will take place in this field in the not distant future.

THE GAS ENGINE

This motor, as you well know, works on a totally different principle from either of the others and has consequently very different characteristics. It is not capable of much change in speed and its economy drops very rapidly as the load falls off, largely because the friction of the engine is very high and is almost constant, irrespective of the load, so that a friction of 20 per cent. at full load means one of 40 per cent. at half load, and so on.

This type of engine is also capable of carrying only very slight overloads; that is to say, its most economical load is its maximum load, and any overload capacity is secured only at the expense of economy and at the price of buying a larger engine. In these respects it is at a great disadvantage as compared with either the steam engine or the turbine, both of which have a large overload capacity which extends far beyond their most economical load. On the other hand, the gas engine cuts out entirely the boiler, and above all it has a heat consumption only about two-thirds or three-fourths of that of the best steam plants.

It was at one time supposed that this fact was destined to make the gas engine the preferred prime mover for all electric power work; but other considerations came in and this expectation has not been realized, and some of the best gas engine men admit that where coal is the fuel used its day of realization has been indefinitely deferred.

COAL GASIFIED VS. COAL UNDER BOILERS

Leaving out of consideration altogether the question of first cost and capital charges for the present, let us consider only the operation. Before coal can be used for gas engines it must be gasified in a gas producer, an apparatus having an efficiency when delivering cold gas (which a gas engine must have) of 75 to 80 per cent., which is almost the same as that of a well designed and operated boiler plant. On that basis the two are even; but while coal may be burnt under boilers for a few cents a ton, say 15c., in large plants, it cannot be gasified for much less than 45c. and often 50c.

Now, the efficiencies of the producer and the boiler being almost the same, the fuel consumed will be in the same rate as the heat consumption of the two motors themselves; say, as a liberal figure, 14,000 B.t.u. for the turbine and 12,300 for the gas engine, a ratio of 1.17 to 1. Then if the coal cost $1 delivered, its cost burnt under boilers is $1.15 and gasified $1.45. The fuel cost is proportional; therefore it is $1.15 $\times$ 1.17 = $1.34 for the steam turbine and $1.45 for the gas engine. That is, the heat units used by the gas engine are less, but the money cost of fuel is more.

This is all based on full load conditions; and while the cost for both goes up very rapidly for lighter loads, owing to the flatter heat consumption curve of the turbine and its smaller relative size owing to its much greater overload capacity, its heat consumption rises much more slowly, and as the use factor in public service work is about 30 to 40 per cent. it will be perfectly obvious that the advantage of the turbine over the gas engine will be much greater in the average than it is at maximum load, even in the heat unit basis. Of course, as the cost of coal rises the case becomes more favorable for the gas engine at full load, but it is very doubtful if under any ordinary commercial conditions its practical economy in the average is much higher than that of the turbine.

THE BLAST FURNACE GAS ENGINE

When we come to the iron industry we come to a different condition, very much more favorable to the gas engine. This is that the fuel to be used is already gasified by the blast furnace, this gas being in fact almost an ideal fuel for gas engines, and they are therefore entirely freed from any change or loss of heat for gasification, except that the sensible heat of the gas, 6 to 8 per cent. in good practice, must be sacrificed to fit the gas for gas engine use.

The steam plant on the other hand is under the necessity of burning this gas under boilers with the same losses as occur in coal firing, except that the labor cost is very small. In the past the economy of furnace boilers has been extremely poor. I have tested boilers where it was down to 30 per cent. and 50 per cent. was about average practice until quite recently; but just at the present time this subject is receiving great attention and boilers are being operated at an efficiency of 75 to 80 per cent. in regular work. In this case the full-load fuel consumptions are proportional to $\frac{77}{1.17} = .66$ and 1.00 — .07 = .93, or 1 to 1.41, with the further advantage that the gas engine is enabled to dispense with one whole operation and its attendant

bother—the gasification of the coal. Moreover, the gas engine has in this service a further great advantage. The use factor is about 60 per cent. for electric service in the steel industry, while for blowing engines it is nearly 80 per cent.

LABOR COSTS AND CAPITAL CHARGES

Why, then, are these engines not in universal use in such plants? Here we come to the real milk in the cocoanut. We have hitherto said nothing of comparative labor costs and of capital charges. In regard to the former the gas engine has had a bad name. The stresses which it undergoes are tremendous and breakdowns in the past were frequent and serious, while the uncertainty of the engine going at all was a decided factor in its early days. But if you remember the prayerful uncertainty with which a man started out on an automobile trip ten or twelve years ago, not knowing when or how he would return, and consider our present entire disregard of this as an important factor, you will admit that many of the defects of that type of motor have been removed and that its reliability now fairly challenges that of the steam engine—a condition which is rapidly becoming, if it has not already become, true of the larger types which we are considering. Nevertheless, the number of parts and variety of their movements is vastly greater in this engine than in the turbine, and the cost of supervision and operation is correspondingly greater. But leaving this question for a few minutes let us turn to that of capital charges.

These are made up of straight interest and an additional percentage on the investment which is set aside and saved at compound interest, so that at the end of the reasonable life of the plant we may have a sum in the bank equal to the original investment, with which we can either pay off the investor or buy a new plant. Any operation which figures its costs on any other basis will probably go broke, and certainly ought to. Five per cent. at compound interest will equal the principal in about 14 years, which is about all the life we have a right to expect from a power plant. If it is not worn out in that time, it has most likely been designed off the map; that is, later improvements will have made it commercially undesirable to operate any longer, even though it be not nearly worn out.

This 5 per cent. added to 7 per cent. of the interest rate which must be figured on industrial plants, gives us 12 per cent. capital charges over and above all operating costs of every kind. This is a minimum figure for plants of this kind. Make no mistake. These are not bookkeeping figures, and the shores of commercial history are covered with the wrecks of plants which failed to provide for these charges. No sensible business man will put money into a property which cannot figure on this basis and still show a profit.

FIGURES FROM ACTUAL PRACTICE

We see, then, that the annual cost of power is made up of fuel, labor and one-eighth of the cost of the plant. Let me illustrate this: I know of a plant where a furnace is blown with two gas blowing engines which cost $107,000 apiece, and which with foundation, house, crane and gas cleaning apparatus and connections erected complete, did not cost less than $275,000. They develop together about 2500 hp, or a cost of $110 per hp installed. Coal of 14,000 B.t.u. in this region costs about $1 at the plant. Steam engines of the best type, with their boilers and all accessories complete could have been installed for $55 per hp. These engines would have required certainly not to exceed 18,000 B.t.u. per hp hour, delivered to the boiler, while the gas engines may get along on 12,000. Counting 8780 hours per year, the loss per year is $6000 \times 8780 = 52{,}680{,}000$ B.t.u. That is a tremendous amount of B.t.u., isn't it? But how much money is it? One ton of coal cost fired, say, $1.15 and contains $2240 \times 14{,}000 = 31{,}360{,}000$ B.t.u. In other words it would require 1 2/3 tons of coal per horsepower year to make up the steam plant's deficiencies, or say $2 worth.

The difference in fixed charges, on the other hand, are 12 per cent. of $(110 - 55) = \$6.60$, or a net loss of $4.60 per hp year by the use of the gas engine with 100 per cent. use factor. On the other hand, gas blowing engines are now being built which can be installed for $75 per hp, and if these were used in a region where coal cost $2.50 per ton, the cost of make-up coal would be $4.20, and the fixed charges in increased investment would be $12 (75—55) = \$2.40$, or a difference of $1.80 in favor of the gas engine under these conditions. This is 9 per cent. on the additional capital required for the gas engine and might be considered a paying though by no means a startling investment. For, owing to the uncertainties of industrial earnings, investors are not commonly interested in them unless they can see a manufacturing profit of about 15 per cent., and it is obvious that any additional expenditure required should show this amount or over, to be justified. In this case the amount is 7 per cent. interest and 9 per cent. net saving, or 16 per cent. in all. It is right in this range of conditions that it begins to be good business to install gas blowing engines, though some authorities would insist that at least 2 to 3 per cent. larger capital charges should be assessed against the gas engine on account of its high rate of physical depreciation.

COMPARISON ON ELECTRIC POWER

Turning now to the generation of electric power, we find the conditions different again, because we have in the steam side the turbine with the direct rotary movement and its great capacity, while on the other we have the relatively slow speed of the gas engine and the consequent high cost of its generator with probably greater friction and less efficiency than when connected to a blower.

For these conditions we may take costs of $70 and $50 respectively per kilowatt installed, and heat consumption per hp of $12{,}500 \div 99 = 13{,}300$ B.t.u. per hp for the gas engine, and

$$\frac{12{,}500 \times .96}{77} = 15{,}600$$

per hp for the turbine, or 17,700 and 21,750 per kw. hp, respectively. The use factor is much lower in electric service than it is in blowing engine service. If we take 60 per cent. we shall be liberal. This means that on account of peak loads, for which it is necessary to provide, the plant in the course of a year will only put out 60 per cent. of its maximum rated power. This factor varies very much in different works, but is higher in all of them than in public service plants. The heat consumptions are about what may be expected under such conditions of loading, and are not altered by this condition, and neither are the costs, but the relations of these two are profoundly altered. The excess thermal units per kw year at full rated capacity for the turbine above those for the gas engine are $8780 \times (21{,}750 - 17{,}300) = 39{,}071{,}000$; and the coal to supply this at 31,000,000 B.t.u. per ton is 1.26 tons at $2.50 per ton. This is worth $3.15 but the use factor is only 60 per cent, so only 60 per cent. as much coal is required for make-up, and

its value drops to $1.90, while the fixed charges are 12 (70—50) = $2.40. In other words, in such a case the saving in coal would not pay all the capital charges on the increased investment, which therefore would be a bad one. Moreover, while the cost of labor and supervision for gas blowers may be no greater than that for steam engines and boilers together, undoubtedly their cost for gas-driven generators is greater than it is for steam turbines and boilers, and this increased cost would further throw the scale against the gas engine. But as the cost of coal rises conditions are reached under which the gas engine pays, while as its first cost falls the fixed charges fall also and tend to make its employment sound from the business point of view.

You will see now, I think, why John Doe in Tyrone, where coal is cheap, may be a fool to do what has paid Richard Roe well in Boston, where coal is dear, and the engine that is the most economical of coal may be far the most wasteful of dollars. A recognition of this must be at the basis of all sound engineering and the fact that it is not always realized by engineers has done more to deprive them of the standing in the business which they should have than any other one thing.

SLOSS-SHEFFIELD'S REPORT

Surplus for Year Ended November 30 Was $21,139, After Preferred Dividend

The annual report of the Sloss-Sheffield Steel & Iron Company for the year ended November 30, 1914, shows a heavy reduction in net earnings. After payment of the preferred stock dividend the surplus was only $21,139, against $209,466 the previous year. The income account is as follows, compared with 1912-13:

	1913-4	1912-3
Gross sales and earnings	$4,708,521	$5,326,554
Operating expenses, maintenance, etc.	3,947,328	4,305,723
Net earnings	$761,193	$1,020,831
Fixed charges	210,000	210,000
Balance	$551,193	$810,831
Depreciation	61,054	132,365
Balance	$490,139	$678,466
Dividends	469,000	469,000
Surplus	$21,139	$209,466
Previous surplus	3,336,414	3,126,948
Total surplus	$3,357,553	$3,336,414

The profit on pig iron shipped was $327,467, against $509,093 the previous year; on coal, $92,781, against $102,684; on coke, $164,391, against $125,612.

The balance sheet, as of November 30, compares as follows:

Assets

	1913-4	1912-3
Property account	$22,618,137	$22,473,647
Treasury securities	244,320	244,320
Stock and bonds of other companies	397,007	400,306
Cash, bills and accounts receivable	890,655	1,035,880
Supplies of raw and finished materials at cost	1,509,727	711,703
Stocks in companies' stores and warehouses at cost	70,006	74,520
Extraordinary repair and renewal funds	112,608	166,108
Insurance and taxes unexpired	6,180	6,028
Total	$25,848,643	$25,112,514

Liabilities

Preferred stock	$6,700,000	$6,700,000
Common stock	10,000,000	10,000,000
Mortgage bonds, 1920	3,000,000	3,000,000
Mortgage bonds, 1918	2,000,000	2,000,000
Accounts payable (current month)	488,511	502,689
Payrolls (current month) after deducting checks, issued	46,709	73,411
Bills payable	1,339,145	500,000
Profit and loss	3,274,277	3,376,413
Total	$25,848,643	$25,112,514

In his remarks accompanying the financial statement President J. C. Maben says:

"The course of the iron market during the period covered was certainly disappointing to all parties interested, for, with the exception of a temporary spurt in the demand for iron during the summer, there was a gradual decline both in demand and prices throughout the year, and it closed with the demand and prices the lowest of the year. Hoping, and there seemed to be a reasonable basis for the hope, that we would have an improved market after the first effects of the war were spent, we declined to meet the very low prices that were being made, in many instances because of the financial necessities of the seller, and at the close of the fiscal year we had accumulated over 147,000 tons of iron on our furnace yards. As no profit on iron is credited until it is shipped, this accumulation of iron reduced the profits of the year and caused us to create a considerable floating debt.

"Although the average furnace capacity in operation during the year was considerably below the average for the last nine years, the production of iron was the largest for any year in that period except one, during which year we were working at practically full capacity throughout the year, and the cost was very materially reduced. At no time in the year were over four furnaces in blast, and toward the close of the fiscal year, owing to the large accumulation of iron on the company's yards, two of the four furnaces were blown out.

"Notwithstanding the increased capacity of our coal mines, referred to in last year's annual report, coal is the only commodity produced by the company which shows a decrease in output during the year, the decrease being about 42,000 tons. A very satisfactory reduction in the cost of coke also was made and, despite the depression in this trade, the profits in this source show a gain of over $38,000.

"The production of iron ore at our Sloss mines was increased 95,000 tons, following a substantial increase in 1913, and the cost was reduced 8c. a ton. Having no use for the ore, the Irondale mines were closed down for the greater part of the year, so that the production was reduced 69,000 tons, but the cost was also reduced 20c. a ton.

"The various stores of the company made a satisfactory showing of earnings for the year but the company's rent rolls show a decrease in income of over $7,000, due to some of the coal and ore mines having been closed down and the miners allowed free rent."

At the annual meeting of the stockholders of the Sloss-Sheffield Steel & Iron Company held in Jersey City, N. J., last week, the number of directors was reduced from 12 to 11. C. B. McNaught retired. The other directors were re-elected and the old officers were also re-elected.

National Lead Company Prosperous

The National Lead Company reports its income account for the year ended December 31, 1914, compared with the previous year, as follows:

	1914	1913
Net earnings	$2,476,293	$2,458,306
Preferred dividends	1,705,732	1,705,732
Balance for common	$770,561	$752,574
Common dividends	619,662	619,662
Surplus for year	$150,899	$132,912
Previous surplus	5,201,331	5,068,420
Total surplus	$5,352,230	$5,201,332

President William W. Lawrence, in his accompanying remarks to stockholders, says in part:

"All departments of the business have suffered losses in volume compared with last year. In some departments the diminution has been serious; in others less so. Those departments whose business lie largely with railroad and manufacturing companies have suffered the greatest losses.

"Considering what has been stated in the preceding paragraph regarding the losses in volume of business, it is gratifying to your directors to again call attention to the wisdom of the company's established policy in diversifying its interests. Notwithstanding the losses in volume reported above, substantial profits in certain departments have offset the losses in profits by reason of decreased tonnage in others. The net result shows that in this period of hard conditions your company as a whole continues to prosper and to continue its regular return to stockholders."

ESTABLISHED 1855

THE IRON AGE

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Union Sheet and Tin-Plate Wages

For the second time a majority of the workmen employed in union sheet and tin-plate mills have voted against the proposed reduction in wages. It is most unusual for the members of a union to repudiate their leaders. In handling matters affecting wages or other terms of employment, the officers of trades unions have generally been the subject of criticism, as they have so often taken an arbitrary stand which the members have supported against their inclinations and best judgment. The officers of the Amalgamated Association of Iron, Steel and Tin-Plate Workers, however, have shown commendable reasonableness in this particular instance, not only in having fully appreciated the position in which owners of mills working under the Amalgamated scale are placed, but also in using their utmost powers of persuasion to induce the rank and file of their organization to accept a reduction in wages and thus place these mills on a better basis of competition with those operating non-union. It would appear, however, that the workers in the mills are not to be convinced that a reduction in wages should be accepted.

As the proposed reduction has been twice rejected, this may be regarded as having completely disposed of the question. The men stand by their rights under the Amalgamated scale signed last year, and which is to apply to the term expiring June 30, and of course they feel sure of getting that rate of wages until that time. It remains to be seen, however, whether the sheet and tin-plate mills in which they are employed can operate on full time. Competitive conditions in the sheet and tin-plate trades are now much sharper than ever before, due to the great expansion of productive capacity in the recent past. It will be remarkable indeed if the non-union mills do not secure a greater share of the new business coming up than would be the case if labor costs were the same in all plants. It is intimated that the workmen in these mills are inviting trouble for themselves after the expiration of the present scale year. The owners of the mills may then refuse to treat with the Amalgamated Association and this would mean that they also would proceed to operate on a non-union basis. The officers of the Amalgamated Association have undoubtedly recognized the precarious position of the organization and wish to avert such a contingency. Three companies, whose men voted to accept the reduction, have already cut loose.

The Canadian Rail Sales

The Algoma Steel Company's sale of 35,000 tons of rails to the Illinois Central Railroad has been widely commented upon; mainly it has been deplored as taking work from American mills where notoriously they have too little. The statement of the officers of the Illinois Central, given in substance on another page, lays stress on the hardships of the railroads and the strong appeal made, therefore, by a saving of $3 a ton or $100,000 in all. The saving may have been more than this, particularly if the Canadian mill waived the extra for nick-and-break tests, of which there are three to the heat, and for which American mills have made an additional charge of 80 cents a ton.

A railroad in whose traffic the raw materials and finished products of iron and steel works figure largely would have no difficulty in deciding in favor of the home mill, even with a cut price of $3 a ton before it from an outside producer. First and last its own traffic might more than make up the difference, if the mill it patronized were on the line. To some important trunk lines the maintenance of a uniform price for rails over a period of years has been no irritant, as it seems to have been to certain western roads, for the former had no disposition to quarrel with the making of a fair profit by their most important customers. On the other hand, some of the western roads have more than once assumed an attitude of antagonism to the steel companies. They have been quite determined at times to bring in foreign rails, and in various controversies over rail specifications they have lent themselves to the attacks of foreign engineering journals on the quality of American rail steel in a way that could only injure domestic rail mills in their efforts to get export business.

Unfortunately the Algoma mill's campaign for business in the United States, at a time when orders from its own roads are insufficient to save it from loss, is connected in some quarters with the issues raised from time to time regarding specifications. The Railway Age Gazette, for example, says:

> With business conditions as they now are the railroads have the means in their own hands of defeating the arbitrary attitude assumed by the manufacturers regarding prices and the revision of specifications.

The thought appears to be in the above, that with rails on the free list and domestic rail mills far from busy, the fear of imports will compel the manufacturers to meet severer specifications with-

out an increase in price or even at a lower price. Both makers and users of rails have been under the harrow in these years of tariff reduction, low freight rates and attacks upon business. A mutual recognition of the need of co-operation is called for at such a time, if ever, and the suggestion that instead this is a time for giving the screws a few extra turns is scarcely calculated to help on the era of good feeling for which the railroads have hoped long and devoutly. "With business conditions as they now are," the railroads as well as the steel companies need all the friends they can muster, in industry, in legislatures, in finance; it is the poorest time that could be picked for any industry or interest to attempt to get another on the hip.

Sometimes advocates show more feeling than those for whom they speak. The railroads and the railmakers have been getting on together better rather than worse, of late. In a number of cases rails have been furnished under the American Railway Engineering Association's specifications, and in general the railroads have conceded that more severe requirements call for added compensation.

To give to the recent purchases of Canadian rails in this country the squint of reprisal by the railroads against domestic rail mills is as faulty an interpretation of them as to hold them up, in the way that has been done, as proofs that a flood of foreign rails would be coming in were it not that European rail mills have been made powerless by the war. The amount of Canadian rails that can be disposed of in the United States at several dollars a ton below domestic prices, after the mill there has secured business enough at home to pay bonded interest, is a negligible fraction of the rail business of this country. European prices at mill are ordinarily as high as those of the mills here, often they have been higher. The intricacy of present specifications, the closeness of inspections, the small possibility of such co-operation between foreign mills and the railroads in the process of manufacture as is more and more the rule here, and other considerations apart from the bare price, will insure to American mills substantially all the rail business of American roads.

Scientific Management in Politics

Manufacturers' associations need to make their plans to circumvent labor legislation in the next Congress aiming to throttle the progress of scientific management. In the last days of the last Congress resort was had to the pernicious rider to enforce a prohibition against expenditures in Government workshops for the time studies involved in systems of scientific management. That these riders did not succeed fully in their intent was shown in the review of this legislation in *The Iron Age* of March 11. Little comfort, however, can be taken in the result, for the influence of the labor interests shows no waning and, in the opinion of close observers, will next be exerted to prohibit Government purchases from private factories operated under scientific management.

This is the feature of the labor programme which must be watched. So long as the fight was over the use of the stop-watch in arsenals and navy yards, there was no general interest among manufacturers. The contest was between the legislative and executive branches of the Government, with exponents of the modern idea of management as the spectators, depending on the Senate to see that industrial development received no check. The futile resistance of the Senate is a matter of history. Legislation to put the stamp of Government disapproval on stop-watch, routing and dispatching methods in private shops will not be so easy. But the possibility of success, as in the limitation of Government purchases to goods made in eight-hour shops, points to the necessity for energetic action by manufacturers, not by convention resolutions but by the personal enlightenment of Congressmen who have been carried off their feet by the labor union onslaught.

War Demand for Machine Tools

At this time it would be premature to attempt to measure in dollars with any degree of accuracy the demand for machine tools which was stirred into life by the war, though the business placed in one Central Western center has been put at more than $6,000,000. The flood of orders for certain types of tools shows no abatement and there are large inquiries which give promise of still greater business. Much depends on the duration of the war. It is possible, however, to review developments up to the present time.

Makers of favored sizes of engine lathes and turret lathes are deluged with orders, while the builders of milling machines, drilling machines and grinding machines, automatics and semi-automatics, etc., are very busy. In brief, it may be said that turning machines of the sizes and designs applicable to the manufacture of shrapnel, lyddite shells and naval projectiles cannot be supplied fast enough. With these tools, and to a less extent with milling and other machines, the great question now is one of deliveries.

The exports have been large, while in this country those who have contracts for shrapnel and other shells and for arms and ammunition have been heavy purchasers. Machine tools have been sold and are being sold in large lots and even the largest of the individual sales arouses but little comment. Any one of them in normal times would be talked about for weeks. For example, 87 high-class turret lathes were ordered in one case and within a few days the same purchaser contracted for as many more machines. Another took 100 lathes and delivery largely influenced his choice. An arms company purchased 292 milling machines in one lot. A recent inquiry called for 600 machines and another for 1000. The purchasing by two Eastern companies aggregates hundreds of machines. The list could be multiplied.

On the other hand, builders of such tools as shaping machines, radial drills, boring mills, planing machines and other larger types have profited only to a slight extent from the war demand. They have been helped by the purchases of those overtaxed manufacturers who in caring for the war demand have increased their facilities. But business from this direction is not nearly enough to make activity normal.

It is noticeable that manufacturers of machine tools who are busy, perhaps night and day, in turning out machinery to assist the nations at war, are

not exuberant over their orders, profitable as these may be. There is a lack of the enthusiasm which accompanies great industrial activity. A builder whose shops are filled with work, when comment was made on the fact, replied with a shake of the head, "But the regular domestic demand is very poor."

In the early months of the war most of the business, domestic and foreign, was direct with the builders of the tools. When makers could not promise the hasty deliveries wanted, dealers who had stocks began to get a larger proportion, and finally the warehouses were combed for second-hand tools as well as new ones. An exporting firm adopted the policy of buying tools in demand before it actually had orders for them. Europe was then cabled as to the deliveries which could be made and only a few days and sometimes only a few hours sufficed to dispose of the machines. The exporters are encountering great trouble in getting cargo space. Again, when they take a speculative chance and arrange for the space, they find trouble in getting timely deliveries of the machines to be shipped.

Many inquiries never arrived at the point where orders were placed. Many were in reality but duplicates, half a dozen firms having put out tentative inquiry. Only one could get the order and sometimes none of them got the business. In a few cases, the entire output of factories for months to come was under option. Later, manufacturers declined to give any options at all.

A few manufacturers of machine tools are endeavoring to reserve some of their product for delivery in months to come to their regular customers, the consumers to whom they must look when the war is over, as they have looked in the past; but the pressure upon them is great and it behooves those who see need of increasing their equipment in the nearer future to arrange for deliveries before conditions become more acute, that is, if they require machines in the lines so greatly in demand. And as for machines of other types, there is no better time to buy than the present, so that when the day of real activity again sets in, as it surely must, they will be prepared to take advantage of it at the outset.

The New Canadian Tariff

The capture of considerable American steel-rail business by Canadian manufacturers draws attention to the difference in tariff conditions in the two countries. On this side of the Canadian line the tariff rates were heavily reduced under the act of 1913, and on some articles, noticeably steel rails, the duty was completely wiped out. The policy of the party at present in power, as shown in the last revision of the tariff, is to place this country on a basis as near free trade as possible. On the other side of the border the policy is in the opposite direction. Every effort has been made in Canada to protect domestic industries, and all customs regulations have for a long time kept that end in view.

Within the past month the Canadian tariff has quietly been revised and almost every rate of duty has been advanced. The advances have been especially noteworthy on products sold in Canada by American manufacturers. The changes in duty were made without any such protracted preliminaries as are invariably followed in this country and no disturbance to business was precipitated by the fiscal revision. The Canadian Government simply felt the necessity of greater revenue, and to meet the exigency decided to advance the rates of duty. Once decided upon, the simple machinery of that Government was put in operation and almost over night the tariff was revised and new rates were in effect. Thus, while our markets are more accessible to Canadian manufacturers than ever before, the Canadian market is made still more difficult of entrance by our manufacturers. The amount of business so far taken by Canadian interests in this country is not large enough to be seriously important, but it is a good beginning and is likely to show steady growth as long as present tariff conditions prevail on the two sides of the border. Again has the theory of tariff revisionists that the lowering of duties in this country will induce other countries to make more favorable terms on American products been overthrown. Other countries make tariffs to suit their own purposes, irrespective of what course we pursue.

CORRESPONDENCE

Saving the Liberty Bell

To the Editor: I have read with much interest the article on the cracking of the Liberty Bell, in your issue of February 18, 1915. I am strongly of the belief that when the original crack was created, had a ⅜-in. to 1-in. hole been drilled at the extreme end of it, as could have been detected by the microscope, the drilling being done slowly to prevent heating, further cracking would have been prevented. Even at this late day, there is so much of value in this simple remedy that it would be worth while to give it a trial. I know that I have ended the cracking of a number of castings, including some massive ones, by following this plan.

THOMAS D. WEST.

Cleveland, Ohio, March 5, 1915.

The Edison Benzol Recovery Plants

Thomas A. Edison announces the successful completion and operation last week of the new benzol recovery plant built in connection with the by-product coke ovens of the Cambria Steel Company at Johnstown, Pa. This plant was erected in 29 working days and has a daily output of 2000 gallons. Another Edison plant, it is announced, will be built adjoining the by-product coke oven department of the Dominion Iron & Steel Company at Sydney, Cape Breton, which will be in operation in 30 days, producing 3000 gallons per day. Another 2000-gallon plant has just been contracted for, but details as to its location are withheld at present. Mr. Edison states that his process of recovery is a simplification of a German method with a view to rendering it quick both as to erection and operation. He expects to be able to operate the plants after the war closes, contrary to some recent statements.

The seventh semi-annual meeting of the American Institute of Chemical Engineers will be held in San Francisco, Cal., August 25 to 28. An itinerary is being arranged for Eastern members so that the interesting natural scenery of the West may be seen, and also some of the more important mining operations, as well as the typical chemical industries of California. J. C. Olsen, secretary, Cooper Union, New York, announces that the itinerary will be ready for distribution in the near future.

LOWER PRICE OF ALGOMA RAILS

Vice-President Parker of Illinois Central on That Phase of the Recent Purchase

The principal factor influencing the Illinois Central Railroad in the placing of 35,000 tons of rails with the Algoma Steel Company's mill at Sault Ste Marie, Ontario, according to Vice-President C. F. Parker of that road, was the urgent necessity of saving $105,000, the net difference in price between the Canadian and domestic rails offered. The usual yearly programme of the Illinois Central has included the purchase of about 50,000 tons of rails, but despite the need of a normal tonnage of new rails to meet the requirements of the ensuing year, it is stated that the road found itself compelled, by reason of the stress of existing conditions, to limit itself to the purchase of 25,000 tons and for this amount its original inquiry was made. In purchasing 35,000 tons in Canada, while the total expenditure was larger than would have been involved in the buying of 25,000 tons of American rails, the lower Canadian price is represented to have been responsible for securing 10,000 tons more than would have been bought otherwise.

While the purchase of this considerable amount by one of the most important railroads was certain to attract particular attention, it is pointed out that not only all of this tonnage but more was certain to be shipped into this country, whether in large lots or distributed among a number of railroads under even greater necessity of economies. Answering some statements as to the recent claims urged in behalf of the railroads, the Illinois Central officials say that their action was not only consistent with the plea the railroads have been making, based on their impoverished conditions, but the very denial of the many natural claims of domestic mills only emphasizes the necessity of profiting by the Canadian proposal. If criticism is to be made, it is suggested that it be directed against those who, by bringing about the removal of the tariff, have compelled the diverting in this instance of $1,000,000 of rail business from American mills. In the past year the Illinois Central's purchases from domestic manufacturers, including 6000 cars and 75 locomotives, are represented to have been larger than those of any other railroad in the country in the same period.

In the matter of rail specifications and previous records of failures, it is stated that the proposals from American mills were entirely satisfactory. The Illinois Central, although it has not previously used Algoma rails in its own tracks, satisfied itself regarding the service records of the Canadian rails it is to purchase. Similar rails laid down in the Canadian trunk lines have been undergoing climatic and service conditions of greater severity, it is claimed, than the Illinois Central lines present.

Second Vote on Sheet and Tin-Plate Wages

On Saturday, March 13, a second referendum vote was taken among workers in sheet and tin-plate mills that sign the Amalgamated scale, and the proposed reduction in wages was again defeated. The officers of the Amalgamated Association did all in their power to have the men agree to accept the proposed reductions, but without avail. Present depressed conditions were pointed out; attention was called to the fact that only a small number of sheet and tin-plate mills now sign the Amalgamated scale; also, that if the men would vote against the reduction, it was very likely that most, if not all, of the mills that now sign the Amalgamated scale would throw their plants open and go on a non-union basis. In spite of this, the men would not agree to accept the reduction. In the sheet mills of the Youngstown Iron & Steel Company and the Brier Hill Steel Company, the men voted strongly in favor of accepting, but in most other mills, notably those in the Wheeling district the vote was adverse. As it is now only a little over three months until the present Amalgamated scale expires, it is probable that the mills affected will continue to operate as best they can, paying Amalgamated rates. They will, however, refuse to treat with the Amalgamated Association on and after July 1. The scales signed last year are in effect to June 30, and the Amalgamated Association officers construe these scales as contracts that cannot be violated, and as being in force until they expire by limitation. The Brier Hill Steel Company, operating the Thomas and Empire sheet mills at Niles, Ohio, and the Trumbull Steel Company, operating sheet and tin-plate mills at Warren, Ohio, have decided to operate their plants on the reduced scale tentatively agreed to March 5 at the conference between the sheet and tin-plate interests and the Amalgamated officials.

Mechanical Engineers in Buffalo

A meeting of members of the American Society of Mechanical Engineers will be held at Buffalo, N. Y., on March 25. Among the papers scheduled are "Present Status of the Fuel Oil Engine in the United States," by S. B. Daugherty, chief engineer of the gas engine department of the Snow Steam Pump Works, and "Power Equipment Used in Steel Plants," by E. E. Kiger, steam engineer of the Lackawanna Steel Company.

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The Iron and Metal Markets

WAR DEMAND GREATER

Machine Tool Purchases Reach Millions

Structural and Bar Business Growing — Steel Rails for France

While March thus far has put new business on the books of most steel companies at a somewhat less rate than that of February, the scale of mill operations has been encouraging. For the whole industry it is around 60 per cent. and for a part of last week the Steel Corporation's steel ingot output got above 69 per cent.

On certain products it is evident that the buying since the first of the year was in compensation for the remarkable stagnation in the closing months of 1914, but elsewhere there are indications of activity of a broader and more hopeful character. This is noticeable in construction lines and in the unusual business on hand at shipyards.

Trade due to the war is increasing and some of the European governments in their negotiations here appear to be looking months ahead. France must get much of her steel from the United States. The Steel Corporation has just sold the French government 8000 tons of girder rails, 6000 tons of 16-lb. rails for portable track and 6000 tons of steel ties. Barb wire has been sold in the past week in considerable lots for export, and negotiations are under way for 36,000 tons of shrapnel steel for one government.

There may be some exaggeration of the extent to which iron and steel and metal working operations are based upon war demand; but in machine tools, particularly lathes and all turning machines, the purchases for Europe have turned depression into prosperity for many concerns. Six months' orders in these lines have run into many millions of dollars.

The signs of new buying in view of the approach of the open season are not numerous, but structural work is growing and the implement works are making larger demands upon bar mills. In the past week the C. & O. bridge at Sciotoville, Ohio, 15,000 tons, has been awarded to the McClintic-Marshall Company after a long delay for financing. New structural contracts figure back to 1.10c., Pittsburgh, and lower.

The Bridge Builders' and Structural Society reports that business taken in February amounted to 30 per cent. of the country's capacity, and this has been the average of the months since July.

Lake shipbuilding is bringing much needed business to the plate mills. Pittsburgh has closed one contract for 4000 tons and 10,000 tons for other Lake boats is pending. For Japan 500 tons has been added to the 2000 tons of plates placed last week at Chicago, the price comparing favorably with that on domestic business.

The railroads have figured in a small way in the new buying of the week. The Burlington has added 5000 tons to its rail order and the Maine Central contract for 8500 tons has gone to the Pennsylvania Steel Company. The Santa Fé has bought 500 cars and the Burlington 50 locomotives. Pending locomotive inquiries are for 85.

Wire mills have made a further advance of $2 a ton on galvanized products. All wire operations are on the largest scale in months.

The advance in tin plate made by the largest producer, from $3.20 to $3.35 per base box, Pittsburgh, has been followed by one or two other companies. In sheets there is considerable variation in prices, black sheets being still sold in some cases as low as 1.70c., Ohio mill. A feature of the sheet trade is the heavy specifying for high-grade sheets by automobile builders. The American Sheet & Tin Plate Company is operating its sheet mills at 68 per cent. of capacity.

Cold rolled shafting extras and discounts have been revised, bringing that trade to a Pittsburgh basis with freight added to destination, and making adjustments in various sizes.

The Steel Corporation's announcement of appropriations for a new steel tie plant at Homestead, for important improvements at New Castle and for a large benzol recovery plant at Gary is one of the encouraging indications.

Foundries are coming into the market here and there for pig iron, but concessions have been made where any considerable business has been done. Southern iron has weakened, some realizing sales being reported at $9.25, Birmingham, and lower for No. 2. In northern Ohio competition has been sharp on both Northern and Southern foundry grades.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type. Declines in Italics

At date, one week, one month, and one year previous.

	Mar. 17, 1915.	Mar. 10, 1915.	Feb. 17, 1915.	Mar. 18, 1914.
Pig Iron, Per Gross Ton:				
No. 2 X, Philadelphia....	$14.25	$14.25	$14.25	$15.00
No. 2, Valley furnace....	13.00	13.00	13.00	13.25
No. 2 Southern, Cin'ti...	*12.15*	12.40	12.40	14.00
No. 2, Birmingham, Ala..	*9.25*	9.50	9.50	10.75
No. 2, furnace, Chicago*	**13.00**	12.75	13.00	14.25
Basic, del'd, eastern Pa..	13.50	13.50	13.50	14.00
Basic, Valley furnace....	12.50	12.50	12.50	13.00
Bessemer, Pittsburgh ...	14.55	14.55	14.55	15.15
Malleable Bess., Ch'go*..	13.00	13.00	13.00	14.25
Gray forge, Pittsburgh...	13.45	13.45	13.45	13.65
L. S. charcoal, Chicago..	15.75	15.75	15.75	15.25
Billets, etc., Per Gross Ton:				
Bess. billets, Pittsburgh..	19.50	19.50	19.50	21.00
O.-h. billets, Pittsburgh..	19.50	19.50	19.50	21.00
O.-h. sheets bars, P'gh...	20.50	20.50	20.50	22.00
Forging billets, base, P'gh.	24.00	24.00	24.00	25.00
O.-h. billets, Phila.....	21.52	21.52	21.40	23.40
Wire rods, Pittsburgh...	25.00	25.00	25.00	26.50
Old Material, Per Gross Ton:				
Iron rails, Chicago.....	12.00	12.00	11.75	12.75
Iron rails, Philadelphia..	13.00	13.00	13.00	16.50
Carwheels, Chicago	10.00	10.00	10.00	11.75
Carwheels, Philadelphia..	11.00	11.00	10.50	12.25
Heavy steel scrap, P'gh..	12.00	12.00	11.75	12.25
Heavy steel scrap, Phila.	10.50	10.50	10.00	11.25
Heavy steel scrap, Ch'go.	9.75	9.75	9.75	9.75
No. 1 cast, Pittsburgh...	11.25	11.25	11.25	11.50
No. 1 cast, Philadelphia.	12.00	12.00	12.00	13.00
No. 1 cast, Ch'go (net ton)	9.00	9.00	9.00	10.25
Finished Iron and Steel,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy, at mill	1.25	1.25	1.25	1.25
Iron bars, Philadelphia..	1.15	1.15	1.20	1.25
Iron bars, Pittsburgh....	1.10	1.10	1.10	1.35
Iron bars, Chicago.....	1.10	1.10	1.07½	1.15
Steel bars, Pittsburgh...	1.15	1.15	1.10	1.20
Steel bars, New York....	1.319	1.319	1.26	1.36
Tank plates, Pittsburgh..	1.10	1.10	1.10	1.15
Tank plates, New York..	1.269	1.269	1.26	1.31
Beams, etc., Pittsburgh..	1.15	1.15	1.10	1.20
Beams, etc., New York...	*1.269*	1.319	1.26	1.31
Skelp, grooved steel, P'gh	1.10	1.10	1.10	1.20
Skelp, sheared steel, P'gh	1.15	1.15	1.15	1.25
Steel hoops, Pittsburgh..	1.25	1.25	1.20	1.30

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	Mar. 17, 1915. Cents.	Mar. 10, 1915. Cents.	Feb. 17, 1915. Cents.	Mar. 18, 1914. Cents.
Sheets, black, No. 28, P'gh.	1.80	1.80	1.80	1.95
Galv. sheets, No. 28, P'gh	3.40	3.40	3.25	2.95
Wire nails, Pittsburgh	1.60	1.60	1.60	1.60
Cut nails, Pittsburgh	1.55	1.55	1.55	1.65
Fence wire, base, P'gh	1.40	1.40	1.40	1.40
Barb wire, galv., P'gh	2.30	2.10	2.00	2.00
Coke, Connellsville,				
Per Net Ton at Oven:				
Furnace coke, prompt	$1.50	$1.50	$1.50	$1.90
Furnace coke, future	1.65	1.65	1.65	2.00
Foundry coke, prompt	2.00	2.00	2.00	2.40
Foundry coke, future	2.15	2.15	2.15	2.65
Metals,				
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	15.25	15.25	15.25	14.75
Electrolytic copper, N. Y.	14.75	14.75	14.62½	14.25
Spelter, St. Louis	9.12½	11.00	8.75	5.15
Spelter, New York	9.62½	11.25	9.00	5.30
Lead, St. Louis	4.00	3.87½	3.72½	3.90
Lead, New York	4.10	3.95	3.85	4.00
Tin, New York	52.50	47.00	36.12½	38.40
Antimony, Hallett's, N. Y.	27.00	25.00	18.50	6.75
Tin plate, 100-lb. box, P'gh	$3.35	$3.20	$3.10	$3.30

Finished Iron and Steel f. o. b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter; 65c. on wrought pipe and boiler tubes. The foregoing rates to the Pacific coast are by rail. The rate via New York and the Panama Canal has no stability, being dependent on vessel charges.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.10c. to 1.15c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 3-16 in. take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.	.10
Gauges under 3-16 in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including straight taper plates), 3 ft. and over	.10
Complete circles 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A" and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in.	1.00
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees, 3 in. and over, 1.15c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angles, 3 in. on one or both legs less than ¼ in. thick as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive.	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive.	.50
Cutting to lengths, under 1 ft.	1.55

No charge for cutting to lengths 3 ft. and over.

Wire Products.—Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, $1.40; galvanized, $2. Galvanized barb wire and fence staples to jobbers, $2.30; painted, $1.60. Wire nails to jobbers, $1.60. Galvanized nails, 1 in. and longer, $1.20 advance over base price; shorter than 1 in., $1.70 advance over base price. Woven wire fencing, 72 per cent. off list for carloads; 71 off for 1000-rod lots; 70 off for less than 1000-rod lots.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Plain Wire, per 100 lb.

Nos.	0 to 9	10	11	12&12½	13	14	15	16
Annealed	$1.50	$1.55	$1.60	$1.65	$1.75	$1.85	$1.95	$2.05
Galvanized	2.00	2.05	2.10	2.15	2.25	2.35	2.75	2.85

Wire Rods.—Bessemer, open-hearth and chain rods, $25.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on steel pipe in effect from February 11, 1915, and iron pipe from February 12, 1915, all full weight:

Butt Weld

Steel: Inches	Black	Galv.	Iron: Inches	Black	Galv.
⅛, ¼ and ⅜	73	52½	⅛ and ¼	66	47
½	77	65½	⅜	65	44
¾ to 3	80	69½	½	69	54
			¾ to 2	72	59

Lap Weld

2	77	66½	1¼	56	43
2½ to 6	79	68½	1½	67	54
7 to 12	77	66½	2	68	56
13 and 14	63½	..	2½ to 4	70	59
15	61	..	4½ to 6	70	59
			7 to 12	68	58

Reamed and Drifted

1 to 3, butt	78	67½	1 to 1½, butt	70	57
2, lap	75	64½	2, butt	70	57
2½ to 6, lap	77	66½	1¼, lap	54	41
			1½, lap	65	52
			2, lap	66	54
			2½ to 4, lap	68	57

Butt Weld, extra strong, plain ends

⅛, ¼ and ⅜	68	55½	⅜	63	50
½	73	64½	½	67	58
¾ to 1½	77	68½	¾ to 1½	71	60
2 to 3	78	69½	2 and 2½	72	61

Lap Weld, extra strong, plain ends

2	74	63½	1½	65	55
2½ to 4	76	65½	2	66	57
4½ to 6	75	64½	2½ to 4	70	59
7 to 8	69	58½	4½ to 6	69	58
9 to 12	64	53½	7 to 8	63	53
			9 to 12	58	47

Butt Weld, double extra strong, plain ends

½	63	54½	½	57	47
¾ to 1½	66	57½	¾ to 1½	60	50
2 to 2½	68	59½	2 and 2½	62	52

Lap Weld, double extra strong, plain ends

2	64	55½	2	58	47
2½ to 4	66	57½	2½ to 4	60	52
4½ to 6	65	56½	4½ to 6	59	51
7 to 8	59	48½	7 to 8	52	42

To the large jobbing trade an additional 5 per cent. is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts to jobbers, in carloads, in effect from May 1, 1914, on steel and from January 2, 1914, on iron, are as follows:

Lap Welded Steel		*Standard Charcoal Iron*	
1⅝ and 2 in.	62	1½ in.	45
2¼ in.	59	1¾ and 2 in.	49
2½ and 2¾ in.	65	2¼ in.	45
3 and 3½ in.	70	2½ and 2¾ in.	54
3½ and 4½ in.	72	3 and 3½ in.	57
5 and 6 in.	65	3½ and 4½ in.	60
7 to 13 in.	62	5 and 6 in.	49

Locomotive and steamship special charcoal grades bring higher prices.

2½ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft., and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points. On standard charcoal iron tubes for desirable orders the above discounts are shaded an extra 5, and occasionally two 5's by some makers.

Sheets.—Makers' prices for mill shipment on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets

	Cents per lb.
Nos. 3 to 8	1.25 to 1.30
Nos. 9 to 10	1.30 to 1.35
Nos. 11 and 12	1.35 to 1.40
Nos. 13 and 14	1.45 to 1.50
Nos. 15 and 16	1.55 to 1.60

Box Annealed Sheets, Cold Rolled

	Cents per lb.
Nos. 10 and 11	1.45 to 1.50
No. 12	1.45 to 1.50
Nos. 13 and 14	1.50 to 1.55
Nos. 15 and 16	1.55 to 1.60
Nos. 17 to 21	1.60 to 1.65
Nos. 22 and 24	1.65 to 1.70
Nos. 25 and 26	1.70 to 1.75
No. 27	1.75 to 1.80
No. 28	1.80 to 1.85
No. 29	1.85 to 1.90
No. 30	1.95 to 2.00

Galvanized Sheets of Black Sheet Gauge

	Cents per lb.
Nos. 10 and 11	2.40
No. 12	2.50
Nos. 13 and 14	2.50
Nos. 15 and 16	2.65
Nos. 17 to 21	2.80
Nos. 22 and 24	2.95
Nos. 25 and 26	3.10
No. 27	3.25
No. 28	3.40
No. 29	3.55
No. 30	3.70

Pittsburgh

PITTSBURGH, PA., March 16, 1915.

The past week has been one of the quietest since the first of the year. Some in the steel trade express the belief that general conditions are not very much better, but as against this is the fact that since January 1 the Carnegie Steel Company has started 17 blast furnaces, Republic Iron & Steel Company 3, Youngstown Sheet & Tube Company 2, and several merchant furnaces have also gone in. Steel mills are running to an average of 60 per cent. or better, and the belief is general that a much larger amount of steel products is going abroad than for a long time. Whether the present rate of operations can be held is a question, but the large steel companies apparently see a good deal of business ahead to justify them in starting up so many blast furnaces. The pig-iron market is dull, and there is not much new demand for billets or sheet bars. The mills are running better on plates, steel bars, sheets and tin plate, and the demand for pipe is also getting better. The coke trade is looking up a little, two large contracts for furnace coke having been closed the past week, but the scrap market is dull and neglected, with prices showing a weaker tendency. Spelter has declined.

Pig Iron.—The only active inquiry in the local market is one from the Pennsylvania Railroad for 2000 to 4000 tons of three different grades of iron for delivery at Altoona, Pa. There is no new demand for basic or Bessemer iron, but some small lots of foundry are being sold at $13 to $13.50, Valley furnace. Prices continue largely nominal. We quote: Bessemer iron, $13.60; basic, $12.50; malleable Bessemer, $12.75; No. 2 foundry, $13 to $13.25, and gray forge, $12.50, all at Valley furnace, with a freight rate of 95c. a ton for delivery in the Cleveland and Pittsburgh districts.

Billets and Sheet Bars.—There is practically no new inquiry. Steel mills here and at Youngstown report specifications against contracts as very active. We quote Bessemer and open-hearth billets at $18.50, and Bessemer and open-hearth sheet bars, $19, f.o.b. maker's mill, Youngstown; Bessemer and open-hearth billets, $19.50 to $20, and Bessemer and open-hearth sheet bars, $20.50 to $21, f.o.b. maker's mill, Pittsburgh. Forging billets are quoted at $24 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 to 0.60 carbon take $1 per ton extra. Axle billets are quoted at $21 to $22.

Ferroalloys.—The situation is unchanged. Carload lots of ferromanganese are being sold for spot shipment at $100 to $105, delivered Pittsburgh. As yet there have been no deliveries on contracts made months ago, before the embargo was declared. Importers are still quoting $78, seaboard, for 80 per cent. English ferromanganese, subject to delay in delivery and to other conditions, which have existed for some time. We quote 50 per cent. ferrosilicon, in lots up to 100 tons, at $73; over 100 tons to 600 tons, $72; over 600 tons, $71; delivered in the Pittsburgh district. On 10 per cent. ferrosilicon the quotation is $18; 11 per cent., $19, and 12 per cent., $20, f.o.b. cars Jackson County, Ohio, or Ashland, Ky., furnace. We quote 20 per cent. spiegeleisen at $25 at furnace. We quote ferrotitanium at 8c. per lb. in carloads, 10c. in 2000-lb. lots and over, and 12½c. in less than 2000-lb. lots.

Steel Rails.—Nothing definite is known here of the report that Russia has placed 40,000 tons of light rails in this country, divided between the Cambria and Carnegie steel companies. The latter interest reports that it has no such order. A good many inquiries for light rails are being received from the traction companies, and actual sales are fairly heavy, the Carnegie Steel Company having received new orders and specifications in the past week for nearly 3000 tons. We quote standard section rails made of Bessemer stock at 1.25c., and of open-hearth 1.34c., f.o.b. Pittsburgh. We quote light rails as follows, in carload lots: 8 and 10 lb. section, 1.275c.; 12 and 14 lb., 1.225c.; 16 and 20 lb., 1.175c.; 25, 30, 35, 40 and 45 lb. sections, 1.125c. The above prices on light rails are sometimes cut $1 per ton or more by the rerolling rail mills.

Structural Material.—The Jones & Laughlin Steel Company has taken 700 tons for the Citizens National Bank building at Evansville, Ind., and the Fort Pitt Bridge Works about 225 tons for a new building for the Elyria Iron & Steel Company, Elyria, Ohio. The Pennsylvania Railroad has placed 225 tons of bridge work at New Kensington, Pa., near Pittsburgh, with the Eastern Steel Company. The McClintic-Marshall Company has taken 200 tons of plate girders for the Hopper loft building. The proposed Frick arcade building, to be erected on Fifth avenue in this city, it is stated, will take about 9000 tons. We quote beams and channels up to 15-in. for March shipment at 1.15c., and 1.20c. for second quarter, f.o.b. Pittsburgh.

Plates.—The Carnegie Steel Company has taken 11,000 tons of plates and shapes for two oil tankers for the Standard Oil Company, to be built by the New York Shipbuilding Company, and 4000 tons of plates and shapes for a new boat for W. R. Grace & Co. to be built by the William Cramp & Sons Ship & Engine Building Company. The Pennsylvania Railroad will build 100 steel flat cars at its shops at Altoona, Pa., the plates for which will come from a Pittsburgh mill. The Baltimore & Ohio Railroad has placed 200 steel car bodies each with the Ralston Steel Car Company, Standard Steel Car Company and American Car & Foundry Company. The new demand for plates is reported fairly active, but some of the smaller plate mills are still in urgent need of orders, and it is stated that the 1.15c. price for March shipment is not being strictly held. We quote ¼-in. and heavier plates at 1.15c. for March and 1.20c. for second quarter delivery.

Sheets.—A feature of the sheet market is the heavy specifications for high grade sheets from the automobile builders. One leading sheet interest has received specifications in the past week for close to 3000 tons. There is also a fairly large amount of black and galvanized sheets, particularly of the latter, going abroad. There has been no further advance in prices of galvanized sheets, and, as spelter has declined, it is not believed the price will be put any higher in the near future. The American Sheet & Tin Plate Company is again operating this week to 68 per cent. of capacity and other sheet mills report they are running better. Prices are firm but unchanged. We quote No. 28 Bessemer black sheets at 1.80c. to 1.85c., No. 28 galvanized at 3.40c., Nos. 9 and 10 blue annealed sheets, 1.30c. to 1.35c.; No. 30 black plate, tin-mill sizes, H. R. & A., 1.95c.; No. 28, 1.90c.; Nos. 27, 26 and 25, 1.85c.; Nos. 22 to 24, 1.80c.; Nos. 17 to 21, 1.75c.; Nos. 15 and 16,

1.70c. The above prices are for carload lots, f.o.b. at maker's mill, jobbers charging the usual advances for small lots from store.

Tin Plate.—Specifications against contracts continue heavy, but some of the makers are not anxious to sell any more of their product than necessary, owing to the uncertainty in the pig tin situation. In fact, this is probably largely the reason why several of the makers have advanced prices recently. The new demand is small, as consumers are covered, but $3.35 now seems to be about minimum of the market on 14 x 20 coke plates.

Wire Rods.—Domestic demand is dull, as consumers are covered. Specifications against contracts are only fairly active. There is some foreign inquiry, and a local mill expects to close this week for about 3000 tons of open-hearth wire rods for shipment to France. Two other inquiries are in the market from that country for about 2000 tons each. We quote Bessemer, open-hearth and chain rods at $25 to $25.50, f.o.b. Pittsburgh.

Steel Carwheels.—No orders of moment for forged steel or cast-iron carwheels have been given out for some time. We quote standard 33-in. freight carwheels, 6¼-in. rough bore, at $15, and standard 36-in. passenger, the same bore, at $21 per wheel, f.o.b. Pittsburgh.

Shafting.—Effective Monday, March 15, a new list of extras on shafting went into effect. The makers state that these new extras do not carry advances in prices, but were simply made to more equally represent prices than was the case with the old extras. The new demand for shafting is only fair. Specifications from the automobile trade have fallen off a good deal since March 1, as the automobile builders have now enough to meet their requirements for this year's trade.

Railroad Spikes.—The new demand is dull, as the railroads have covered their 1915 needs. Specifications against contracts are now coming in at a fairly good rate, shipments to start in early April. We quote standard railroad spikes at $1.35 to $1.40, and small spikes at $1.45 to $1.50 in carload and larger lots, f.o.b. Pittsburgh.

Skelp.—The mills rolling skelp have more orders booked than for some time, but the new demand is quiet. Prices are firm, but no higher. We quote grooved steel skelp, 1.10c. to 1.15c.; sheared steel skelp, 1.15c. to 1.20c.; grooved iron skelp, 1.50c.; sheared iron skelp, 1.50c. to 1.60c., delivered to consumers' mills in the Pittsburgh district.

Hoops and Bands.—Most consumers are covered to April 1, and in some cases through second quarter, and the mills report specifications coming in at a fair rate. We quote steel bands at 1.15c. for March delivery and 1.20c. for second quarter, with extras as per the steel bar card. Prices on steel hoops are firm at 1.25c. to 1.30c. at mill.

Wire Products.—Specifications against contracts for wire and wire nails taken when prices were slightly lower than they are now quoted are coming in at a good rate, and shipments by the mills are heavier than for some time. In fact, some of the larger wire mills are running practically full for the first time since last summer. There is still a heavy inquiry for barb wire from abroad, and several large lots have recently been closed. As yet only a few small sales of wire and wire nails have been made at present prices. Mills quote on new orders as follows: Wire nails, $1.60; galvanized nails 1 in. and shorter taking an advance of $1.70 over this price, or $3.30, and galvanized nails, 1 in. and longer, an advance of $1.20, or $2.80; plain annealed wire, $1.40; galvanized barb wire and fence staples, $2.30; painted barb wire, $1.60, all f.o.b. Pittsburgh, freight added to point of delivery, terms 30 days net, less 2 per cent. for cash in 10 days. We quote woven wire fencing at 72 per cent. off in carload lots, 71 per cent. off on 1000-rod lots and 70 per cent. on small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—There is a good deal of activity in the steel-bar trade, the mills of the Carnegie Steel Company at Duquesne now being in operation on practically a full schedule. As yet little business has been placed at the 1.15c. price for March, but the reason given for this is that consumers are covered up to April and in some cases through second quarter. The new demand for steel bars for reinforcing purposes is quite active, the Cambria Steel Company having recently taken 17,000 tons for the Boston Elevated Railroad. We quote steel bars for March shipment at 1.15c. and for second quarter 1.20c., f.o.b. Pittsburgh. Common iron bars, made from part scrap, are 1.10c. to 1.15c., maker's mill.

Merchant Steel.—New demand is fairly active and specifications against contracts are coming in at a better rate than for some time. Prices are firmer but no higher. On small lots for prompt shipment we quote: Iron finished tire, ½ x 1½ in. and larger, 1.30c. base; under ½ x 1½ in., 1.45c.; planished tire, 1.50c.; channel tire, ¾ to ⅞ and 1 in., 1.80c. to 1.90c.; 1⅛ in. and larger, 1.90c.; toe calk, 1.90c. to 2c., base; flat sleigh shoe, 1.65c.; concave and convex, 1.70c.; cutter shoe, tapered or bent, 2.20c. to 2.30c.; spring steel, 1.90c. to 2c.; machinery steel, smooth finish, 1.70c.

Cold-Rolled Strip Steel.—Makers state that the new demand is fair and specifications against contracts are coming in quite freely. Prices are firm. We quote hard-rolled steel, 1½ in. and wider, under 0.20 carbon, sheared or natural mill edges, per 100 lb., $2.75 delivered. Extras, which are standard among all the mills, are as follows:

Thickness, in.	Extras for thickness	Extras for soft or intermediate tempers	Extras for straightening and cutting to lengths not less than 24 in.
0.100 and heavier	Base	$0.25	$0.10
0.099 to 0.050	$0.05	0.25	0.15
0.049 to 0.035	0.20	0.25	0.15
0.034 to 0.031	0.35	0.40	0.25
0.030 to 0.025	0.45	0.40	0.40
0.024 to 0.020	0.55	0.40	0.50
0.019 to 0.017	0.85	0.50	1.10
0.016 to 0.015	1.25	0.50	1.10
0.014 to 0.013	1.95	0.50	1.25
0.012	2.30	0.50	coils only
0.011	2.65	0.50	coils only
0.010	3.00	0.50	coils only

Wrought Pipe.—Mills report that the new demand for tubular goods is holding up and is expected to be heavier in the very near future, as outside work will start in a short time. No large gas or oil lines have recently been closed, but several are under negotiation. As prices of spelter have declined in the past week, it is not believed there will be any further advance in galvanized pipe in the near future. Discounts on iron and steel pipe are being firmly held.

Boiler Tubes.—The new demand for locomotive and merchant tubes is only fair, mostly for small lots for prompt shipment. Large consumers are covered by contracts and specifications are coming in at a good rate. Discounts on both iron and steel boiler tubes are still more or less shaded, depending on the order.

Coke.—Pickands, Mather & Co., who will soon start Perry furnace at Erie, Pa., have closed with the Producers' Coke Company, Uniontown, Pa., for 10,000 to 11,000 tons of coke per month, running over the remainder of this year. The Girard Iron Company expects to start its Mattie furnace at Girard, Ohio, about April 1, and has closed with the J. H. Hillman & Sons Company for 11,000 to 12,000 tons of coke per month for all of this year. There is not much demand for spot coke, but two or three more merchant furnaces may start in the near future that have not covered on their coke. The output of coke in the upper and lower Connellsville regions for the week ended March 6 was 274,652 tons, a decrease over the previous week of 283 tons. We quote standard makes of blast-furnace coke for prompt shipments from $1.50 to $1.60; on contracts for delivery up to July 1, $1.65, and for delivery over all of 1915, at $1.75 per net ton at oven. Standard makes of 72-hr. foundry coke are held at about $2 for prompt shipments and from $2.15 up on contracts.

Old Material.—The heavy melting scrap of the Pennsylvania Railroad is reported to have been taken by a local consumer at about $12.50 delivered. The local scrap market is quiet, and there is very little inquiry. Most dealers are not inclined to sell unless they have the scrap, being afraid to go short on the

market. If the increased rate of operations among the steel mills continues, it is believed the demand for scrap will be heavier in the near future. For delivery to consumers' mills in the Pittsburgh and other districts that take Pittsburgh freights dealers quote as follows:

Heavy steel melting scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh delivery	$12.00 to $12.50
Compressed side and end sheet scrap	10.25 to 10.50
No. 1 foundry cast	11.25 to 11.50
Bundled sheet scrap, f.o.b. consumers' mills, Pittsburgh district	9.25 to 9.50
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	11.75 to 12.00
No. 1 railroad malleable stock	10.00 to 10.25
Railroad grate bars	8.50 to 8.75
Low phosphorus melting stock	13.25 to 13.50
Iron car axles	18.75 to 19.25
Steel car axles	13.25 to 13.75
Locomotive axles, steel	19.75 to 20.25
No. 1 busheling scrap	9.75 to 10.00
No. 2 busheling scrap	7.00 to 7.25
Machine shop turnings	7.50 to 7.75
Old carwheels	10.75 to 11.00
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	12.00 to 12.25
Old iron rails	12.75 to 13.00
No. 1 railroad wrought scrap	10.75 to 11.00
Heavy steel axle turnings	8.50 to 8.75
Heavy breakable cast scrap	10.75 to 11.00

*Shipping point.

Chicago

CHICAGO, ILL., March 16, 1915.—(*By Wire.*)

New buying in the past week has hardly been a criterion of the trend of business. In most lines consumers are covered for their regular requirements and while heavier operations, particularly in the case of agricultural implement manufacturers, have occasioned more liberal specifications, few new projects are appearing. The Burlington has increased its rail purchases by another 5000 tons and has placed an order for 50 locomotives. The Santa Fé has bought 500 cars. There remains in sight other scattering railroad business in rails, track fastenings and cars, but actual inquiries are of unimportant size. An additional plate order from Japan is noted, but in shapes and bars new tonnage is exceedingly meager. Steel-bar specifications are running heavier, but the flow of bar-iron tonnage appears to be nearly spent and the shutting down of one mill is contemplated. The mills of this district, including those of the largest interest, are operating at close to 60 per cent. This scale of operations has been largely supported by the demand for rods and billets to meet the very nearly normal trade in wire products. The particular handicap of the mills just now is the lack of any assurance of continuous operation based on tonnage in prospect. In pig iron there is also a lull in buying contrasted with a slightly increased melt of pig iron.

Pig Iron.—There is current in this market a possible 10,000 tons of inquiry for third quarter and last half, but the manner in which the inquiry is being pressed reflects something of its premature character and evidences of a lull are to be noted. At the same time shipments of iron on contract are going forward even more readily, from which it may be assumed that foundry activity is greater. Such inquiry as the market presents for deliveries in the second quarter are for modest tonnages, in connection with which the furnace position appears to be uniformly maintained on the basis of $13 for No. 2. It has not been established that the same price cannot be secured for last half business, though at least one furnace is insisting upon a premium of 50c. a ton. Iron adaptable to many uses for first half delivery, though not of standard grading, may be had as low as $12.50 at the furnace. In this market $9.50, Birmingham, is being obtained by Southern furnaces, with an advance of 25c. a ton for last half. Reports of lower prices for Southern iron appear to be based on offers said to have been made by receivers recently appointed. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace and do not include a switching charge averaging 50c. a ton:

Lake Superior charcoal, Nos. 2 to 5	$15.75
Lake Superior charcoal, No. 1	16.25
Lake Superior charcoal, No. 6 and Scotch	16.75
Northern coke foundry, No. 1	$13.25 to 13.50
Northern coke foundry, No. 2	13.00 to 13.25
Northern coke foundry, No. 3	12.50 to 13.00
Southern coke, No. 1 f'dry and 1 soft	13.75 to 14.25
Southern coke, No. 2 f'dry and 2 soft	13.50 to 13.75
Malleable Bessemer	13.00 to 13.25
Standard Bessemer	15.50
Basic	12.50 to 13.00
Low phosphorus	20.00 to 20.50
Jackson Co. and Ky. silvery, 6 per cent.	16.90 to 17.40
Jackson Co. and Ky. silvery, 8 per cent.	17.90 to 18.40
Jackson Co. and Ky. silv'y, 10 per cent.	18.90 to 19.40

(*By Mail*)

Rails and Track Supplies.—The Chicago, Burlington & Quincy Railroad has bought 50 locomotives and has distributed orders for 5000 tons more of rails, of which 2000 tons has already been mentioned as going to the Cambria Steel Company and Pennsylvania Steel Company, 3000 tons having been given to the Lackawanna Steel Company. There remain to be placed several small lots of rails, but in each case the quantity is under 2000 tons. Some new buying of spikes and track bolts is noted, competition for which, particularly from mills outside of this territory, has brought out considerable weakness in quotations. We quote standard railroad spikes at 1.45c. to 1.50c., base; track bolts with square nuts, 1.90c., base, all in carload lots, Chicago; tie plates, $23.50 to $25, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, 1.25c., base; open-hearth, 1.34c.; light rails, 25 to 45 lb., 1.07c.; 16 to 20 lb., 1.12c.; 12 lb., 1.17c.; 8 lb., 1.22c.; angle bars, 1.50c., Chicago.

Structural Material.—Contracts for the fabrication of steel reported placed last week aggregated about 3000 tons, including 717 tons for the Eiger Building, Chicago, awarded to the Hansell-Elcock Company; 500 tons for a public utilities building, San Francisco, to the Central Iron Works; 370 tons for the municipal pier at Chicago to the South Halsted Street Iron Works; 350 tons for the Great Northern Railroad to the Milwaukee Bridge Company; 497 tons for a hotel at Minneapolis to the Crown Iron Works, and various other contracts of from 100 to 200 tons. Structural specifications have been disappointingly light, while new orders are, for the most part, of 100 tons and less. The Santa Fé has ordered 500 cars from the American Car & Foundry Company. We quote for Chicago delivery of structural shapes from mill, 1.339c.

The fact that nearly all of the new business in structural material now appearing is confined to small tonnages has added to the activity of the iron and steel stores. We continue to quote for plain shapes out of stock 1.75c.

Plates.—The placing of 2000 tons of plates with Chicago mills for Japan delivery, mentioned last week, has been supplemented by an additional order for 500 tons. As compared with ruling domestic quotations, this business has been secured at what are attractive prices. A number of small orders for plates are noted and they are of interest chiefly as indicating the general adherence of the mills to the 1.15c., Pittsburgh, basis. We quote for Chicago delivery of plates from mill 1.339c.

Store prices are unchanged and we quote for Chicago delivery of plates from stock 1.75c.

Sheets.—One mill in this district continues to decline new business in galvanized sheets at any price. Other makers, however, are quoting 3.40c. on limited tonnages, and there is some report of 3.50c. being asked. The activity in black sheets shows, if anything, a recession in the amount of tonnage coming up for placement, while blue annealed sheets, for which the demand was somewhat improved, are barely holding their own. We quote for Chicago delivery from mill: No. 10 blue annealed, 1.489c. to 1.539c.; No. 28 black, 1.939c. to 1.989c.; No. 28 galvanized, 3.589c.

Although the mill situation and mill price, with respect to galvanized sheets, are such as to make the store price in this territory almost directly competitive, with the advantage of prompt delivery, users of galvanized sheets are buying only what is absolutely necessary and store business has not increased to any pronounced extent. We quote for Chicago delivery from jobbers' stocks as follows, minimum prices applying on bundles of 25 or more: No. 10 blue annealed, 1.95c.; No. 28 black, 2.55c.; No. 28 galvanized, 3.65c. to 3.75c.

Bars.—Steel-bar specifications from the agricultural implement manufacturers indicate a heavier scale of operations in their plants. Aside from these specifications there is very little business coming out. The bar-iron market continues to reflect a strengthening of underlying conditions, and, while practically all of the tonnage customers are likely to need in the immediate future was brought in by the recent advance in prices, making the prospect rather lean, prices appear to be firmer than this market has known them to be for many months. On the basis of tonnage at present in sight, the Republic Iron & Steel Company plans to shut down its Inland mill temporarily within a week. We quote for mill shipments as follows: Bar iron, 1.10c. to 1.15c.; soft steel bars, 1.289c. to 1.339c.; hard steel bars, 1.20c.; shafting in carloads, 65 to 68 per cent. off; less than carloads, 60 to 65 per cent. off.

We quote store prices for Chicago delivery: Soft steel bars, 1.65c.; bar iron, 1.65c.; reinforcing bars, 1.65c. base, with 5c. extra for twisting in sizes ½ in. and over and usual card extras for smaller sizes; shafting 62 per cent. off.

Rivets and Bolts.—The very low prices which prevailed in the local bar-iron market appear to have been at the bottom of the disorganized market for bolts and nuts, recently existing. With the expiration of some of these low-priced contracts the market has resumed a more normal level, even those makers who were disposed to offer concessions having brought their quotations up in line with the general market. Rivet prices appear to vary in accordance with what the seller finds himself able to get. Our quotations are as follows: Carriage bolts up to ⅝ x 6 in., rolled thread, 80-20; cut thread, 80-15; larger sizes, 80; machine bolts up to ⅝ x 4 in., rolled thread, 80-25; cut thread, 80-20; larger sizes, 80-5; coach screws, 85-5; hot pressed nuts, square, $6.80 to $6.60 off per cwt.; hexagon, $7.80 to $7.60 off per cwt. Structural rivets, ¾ to 1¼ in., 1.50c. to 1.55c., base, Chicago, in carload lots; boiler rivets, 10c., additional.

We quote out of store: Structural rivets, 2c.; boiler rivets, 2.10c.; machine bolts up to ¾ x 4 in., 75-15; larger sizes, 70-10-10; carriage bolts up to ¾ x 6 in., 75-10; larger sizes, 70-15 off; hot pressed nuts, square, $6, and hexagon, $6.70 off per cwt.

Wire Products.—Orders for both export and domestic shipment are reported as close to normal tonnage for this the heavy season. It is understood that a substantial part of the tonnage of billets and rods upon which local mills have increased their operating schedules is going into wire products. A further advance of $2 per ton has been made on galvanized wire products. We quote to jobbers as follows: Plain wire, No. 9 and coarser, base, $1.589; wire nails, $1.789; painted barb wire, $1.789; galvanized barb wire, $2.389; polished staples, $1.789; galvanized staples, $2.389, all Chicago.

Cast-Iron Pipe.—For the 12,500 tons of pipe at Cleveland, the leading interest appears to be the low bidder and that company has also taken other smaller contracts, including 300 tons at Burton, Kan., and 600 tons at Holton, Kan. J. B. Clow & Son will furnish 460 tons for Orion, Mich., and the American Cast Iron Pipe Company 300 tons for Chillicothe, Mo. New requirements include 3100 tons for Grand Rapids, Mich., and 800 tons for Billings, Mont. We quote as follows, per net ton, Chicago: Water pipe, 4 in., $25.50; 6 to 12 in., $23.50; 16 in. and up, $23, with $1 extra for gas pipe.

Old Material.—The quietness in the scrap market has grown more pronounced. Melters appear to be influenced to buy such small amounts as they are taking, more as an accommodation and at prices slightly under the market than because of any general need of the material. Weakness, which is coincident with lack of demand, is especially pronounced with respect to cast scrap, stove plate and kindred grades. Prices are soft at the levels quoted, although transactions are too few, except in one or two grades, to establish generally lower quotations. Greater weakness in the market is avoided by reason of the limited tonnage of scrap coming from the railroads. Current lists include 1700 tons from the Michigan Central and 2700 tons from the Union Pacific, but little of the latter list will come to this market.

We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

	Per Gross Ton	
Old iron rails	$12.00 to	$12.25
Old steel rails, rerolling	10.25 to	10.75
Old steel rails, less than 3 ft.	10.25 to	10.50
Old carwheels	10.00 to	10.50
Heavy melting steel scrap	9.75 to	10.00
Frogs, switches and guards, cut apart	9.75 to	10.00
Shoveling steel	9.25 to	9.50
Steel axle turnings	7.00 to	7.50

	Per Net Ton	
Iron angles and splice bars	$11.50 to	$12.00
Iron arch bars and transoms	11.75 to	12.25
Steel angle bars	8.50 to	9.00
Iron car axles	13.75 to	14.25
Steel car axles	11.50 to	12.00
No. 1 railroad wrought	9.00 to	9.50
No. 2 railroad wrought	8.50 to	9.00
Cut forge	8.50 to	9.00
Steel knuckles and couplers	8.75 to	9.00
Steel springs	9.25 to	9.75
Locomotive tires, smooth	8.50 to	9.00
Machine shop turnings	5.50 to	6.00
Cast borings	4.75 to	5.25
No. 1 busheling	8.00 to	8.50
No. 2 busheling	7.00 to	7.25
No. 1 boilers, cut to sheets and rings	5.50 to	6.00
Boiler punchings	8.25 to	8.50
No. 1 cast scrap	9.00 to	9.25
Stove plate and light cast scrap	8.00 to	8.25
Grate bars	7.75 to	8.00
Railroad malleable	7.75 to	8.25
Agricultural malleable	7.25 to	7.50
Pipes and flues	7.00 to	7.50

Philadelphia

PHILADELPHIA, PA., March 16, 1915.

Weak spots are still conspicuous in the market, but with some of the steel companies which have a diversified line of products a distinct betterment exists. One of these companies is operating its mills at approximately 85 per cent. of capacity. On the other hand, business in sheets, plates and billets continues to drag, and for these, as well as for plain structural material, prices are unsatisfactory, as they continue to be adversely affected by quotations, or options, which were given when lower prices prevailed for prompt business. One steel company has just contracted to supply about 14,000 tons of steel rounds for shrapnel-making and more business of this kind is pending. Large orders from Russia are anticipated for light rails, steel axles, cars and steel underframes. France is showing some interest in rails. Domestic railroad buying continues relatively unimportant, and the large number of idle cars is considered a discouraging feature. Reinforcing bars are more active than plain bars. Projects requiring structural steel are slightly more numerous and more substantial. The demand on merchant furnaces for pig iron appears to be even quieter than it has been, although the Pennsylvania Railroad has issued a good inquiry. Better operations at the steel mills have imparted a little more strength to old material.

Iron Ore.—The dull state of the market is unchanged. There arrived from Cuba last week 4720 tons. Total importations at this port in February amounted to 42,916 tons.

Pig Iron.—The demand for iron is quiet, in fact, more so that it has been in preceding weeks. There is one attractive inquiry which was issued by the Pennsylvania Railroad, otherwise inquiries and sales as well have been mostly of the small lot variety. The railroad is inquiring for 400 to 800 tons of high manganese iron, 700 to 1400 tons of low silicon iron and 1000 to 2000 tons of No. 2 foundry. The buying of Virginia iron has improved a little, but deliveries are no greater in volume. Basic is inactive, but some low phosphorus is moving and there is a well-defined report that a nearby steel company which makes armor plate and projectiles has bought 3000 tons of low phosphorus following a similar purchase two or three weeks ago. The inquiries from abroad for low phosphorus and Bessemer iron continue, but no great amount of business has been done here. In some cases ocean freights are prohibitively high. On a sample lot of 10 tons, 45s. ($10.95) has been asked. Foundries in this territory are not increasing their output, which explains the demand for small lots. The Southern Railway has purchased 575 tons of miscellaneous grades required for its car

shops at Lenore City, Tenn. Quotations for standard brands for early delivery in buyers' yards in this district are as follows:

Eastern Penna. No. 2 X foundry	$14.25 to $14.50
Eastern Penna. No. 2 plain	14.00 to 14.25
Virginia No. 2 X foundry	15.25
Virginia No. 2 plain	15.00
Gray forge	13.25 to 13.50
Basic	13.50
Standard low phosphorus	20.00 to 20.50

Ferroalloys.—The nominal quotation for 80 per cent. ferromanganese continues at $78, seaboard, and abroad there appear to be no developments of any sort so far as the trade here knows. No shipments from England are reported as on the way. There have been, however, some shipments of ferrosilicon from England. Quotations for 50 per cent. ferrosilicon are $71 to $73, Pittsburgh, according to quantity.

Bars.—Specifications for ordinary steel bars have been good although new business is coming out slowly. The Western Maryland Railroad bought 100 tons. The Isthmian Canal Commission will open bids March 30 on 680 tons of twisted and deformed reinforcing bars ranging from ¼ in. to 1¼ in. The general demand for concrete reinforcing bars has been rather good. Ordinary iron bars are unchanged at 1.15c. to 1.20c., Philadelphia, with concessions possible in some directions. Most manufacturers, however, are endeavoring to hold 1.10c. at the mill or 1.174c. Philadelphia.

Plates.—With most makers in this vicinity the week was quieter than the preceding one. The bulk of the ship business is going to the large interest. It is largely a buyers' market. Makers are striving to hold to 1.309c. for delivery this month and $1 a ton more for delivery in the next two months, but these prices are being shaded and there is an outcropping of hold-over quotations. The Baldwin Locomotive Works has an order for 50 locomotives for the Chicago, Burlington & Quincy Railroad, but it is pointed out that this order stands practically alone and constitutes only about a week's work for the company.

Steel Rails.—The feature with eastern Pennsylvania rail mills is the business done in girder rails for delivery to the West, in part to the Pacific coast by way of the Panama Canal. The Pennsylvania Steel Company has taken approximately 3000 tons of this business. The same company has taken 800 tons of T rails for the New York Municipal Railways Company. The Maine Central has placed 8500 tons. Some excellent foreign business is pending. A local company expects to roll about 12,000 tons of light rails for Russia, and France is expected to take some as well. The tests of various specifications for the Pennsylvania Railroad have been concluded and some announcement may be expected soon.

Structural Material.—Fabricated work is still moving slowly although there is a betterment in the number of projects coming out and these are of a more substantial character than has been the case in recent months. Plain material is in better demand, but prices are unsatisfactory, inasmuch as old quotations prevail in many instances. On new propositions it is sought to obtain 1.309c., Philadelphia. The Eastern Steel Company will supply about 200 tons for a bridge at New Kensington, Pa., for the Pennsylvania Railroad. Frederick Webber, architect, Morris Building, this city, is taking on about 750 tons required for a 12-story apartment house in Philadelphia. A hospital in this city, for which Irwin & Leighton have the contract, will take about 400 tons. An extremely large order for steel underframes for cars is anticipated from Russia.

Sheets.—The demand continues light and unsatisfactory, with 1.45c. for No. 10 blue annealed, about the minimum quoted by local mills for delivery in this vicinity.

Billets.—The market continues dull and featureless, with the quotation unchanged at $21.52, Philadelphia, for basic open-hearth rolling billets. An extra of $4 a ton is asked for forging steel.

Coke.—There is no activity beyond the movement of an occasional carload. Quotations are unchanged at $1.50 to $1.55 per net ton at oven for prompt shipment furnace coke and $2 to $2.25 for prompt shipment foundry coke. Freight rates from the principal producing districts are as follows: Connellsville, $2.05; Latrobe, $1.85, and Mountain, $1.65.

Old Material.—The market shows a further gain and heavy melting steel is now quoted at $11 to $11.25. For a moderate sized quantity $11 has been paid, and $11.25 is reported to have been offered. In some cases the mills have taken lower grades of steel scrap than they are accustomed to use. Bundled sheets are stronger. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to $1.35 per gross ton, are as follows:

No. 1 heavy melting steel	$11.00 to $11.25
Old steel rails, rerolling	11.00 to 11.25
Low phos. heavy melting steel scrap	14.25 to 14.50
Old steel axles	14.00 to 14.50
Old iron axles	17.50 to 18.00
Old iron rails	13.00 to 14.00
Old carwheels	11.00 to 11.50
No. 1 railroad wrought	12.50 to 13.00
Wrought-iron pipe	10.00 to 10.50
No. 1 forge fire	8.00 to 8.50
Bundled Sheets	8.50 to 9.00
No. 2 busheling	7.75 to 8.25
Machine shop turnings	8.00 to 8.50
Cast borings	8.00 to 8.50
No. 1 cast	12.00 to 12.50
Grate bars, railroad	8.75 to 9.25
Stove plate	8.75 to 9.25
Railroad malleable	9.00 to 9.50

Buffalo

BUFFALO, N. Y., March 16, 1915.

Pig Iron.—Most of the producing interests of the district report that bookings for the week were slightly better than the average, aggregating about 4000 tons including all grades of foundry and malleable, and for current and second quarter delivery. There has been a little inquiry for third quarter and last half iron, but for such delivery furnaces are asking higher than current schedule prices. No change is noted in first-half prices, the range for which is the same as reported last week, $12.25 to $12.50 at furnace for low silicon irons and $13 to $13.25 for the higher grades, one furnace limiting its bookings to $13 minimum. We quote as follows for first half delivery f.o.b. furnace:

No. 1 foundry	$13.00 to $13.25
No. 2 X foundry	12.75 to 13.00
No. 2 plain	12.50
No. 3 foundry	12.25 to 12.50
Gray forge	12.25 to 12.50
Malleable	12.75 to 13.00
Basic	13.50 to 13.75
Charcoal, regular grades and analysis.	*15.75 to 17.00

*The minimum applying only to direct shipments from furnace instead of from storage yards or docks at Buffalo.

Finished Iron and Steel.—While stocks in consumers' hands are low, buying appears to be confined to immediate needs. Sellers believe this will have a cumulative effect on buying later on. Specifications on steel bar contracts are coming in fairly well. Several building projects are maturing which will require good tonnages of reinforcing bars. Contracting for tin plate in general is quite heavy and prices have gone up 15c. per base box to $3.35 base. Prices for bars, plates and shapes are holding firm at 1.15c. for March business. Steel pipe specifications for the week have been good, principally for jobbing stocks for the spring building trade. Manufacturers of cold finished steel, shafting and screw stock, have put into effect, commencing March 15, a new standard list changing the method of selling from a delivered territory basis to an f.o.b. Pittsburgh base with actual freight added to destination, thus equalizing the present costs of producing various sizes, as compared with the old list, which has been in force for many years. A good run of small tonnage inquiry in fabricated structural material is noted and larger business for the spring and summer is developing. The Lackawanna Steel Company, this city, has taken 2000 tons for a New England factory. The Buffalo Structural Steel Company has 200 tons for the Knights of Columbus Club House, Buffalo, and the Western Building Company, Buffalo, has the general contract involving 100 tons for the United Natural Gas Company, near Bradford, Pa. Bids are to be taken next week for 120 tons of steel for a store and office building for Robert W. Pomeroy, Buffalo.

Old Material.—Demand has been light and transactions of very small volume. Notwithstanding this, dealers are very firm in their price views and are holding stiffly to the current schedule, which is as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$10.50 to $10.75
Low phosphorus steel	13.00 to 13.50
No. 1 railroad wrought scrap	10.00 to 10.50
No. 1 railroad and machinery cast	10.50 to 11.00
Old steel axles	12.00 to 12.50
Old iron axles	16.00 to 16.50
Old carwheels	10.50 to 11.00
Railroad malleable	9.50 to 10.00
Machine shop turnings	5.75 to 6.25
Heavy axle turnings	8.50 to 9.00
Clean cast borings	6.50 to 7.00
Old iron rails	11.00 to 11.50
Locomotive grate bars	9.00 to 9.50
Stove plate (net ton)	8.25 to 8.75
Wrought pipe	6.50 to 7.00
Bundled sheet scrap	7.25 to 7.75
No. 1 busheling scrap	8.00 to 8.50
No. 2 busheling scrap	5.50 to 6.00
Bundled tin scrap	10.00

Cincinnati

CINCINNATI, OHIO, March 17, 1915.—(*By Wire.*)

Pig Iron.—The slim inquiry is a matter of much comment, but sellers are making strong efforts to obtain business in a quiet way and they have been successful in a limited degree. Most of the business booked lately is of the bargain counter variety, principally for small lots to be shipped before July 1. As buyers are able to contract for Southern No. 2 foundry at $9.50, Birmingham, and Northern at $12.75, Ironton, both for strictly last half shipment, they have been naturally of the opinion that prompt iron should be available at lower figures. This has tended to soften the market and the Southern price situation has been further affected by the willingness of at least one interest to dispose of a limited tonnage of foundry iron below the market to obtain ready cash for some pressing obligations. Special conditions governed all of these sales, payment for the iron being made practically as soon as loaded on cars. Northern foundry iron is said to be moving on contracts at a satisfactory rate, but new buying is limited. It is known that several special lots for immediate shipment were bought a few cents below the market price, but the furnaces claim that they are now below the cost mark and are not disposed to make any reductions for business, no matter how tempting the tonnage may be. A nearby consumer purchased 500 tons of Southern foundry iron for shipment through the third quarter and several smaller sales are reported to Indiana melters. The Ohio silvery irons have shown some activity in the past 10 days, and in some instances a reduction of 25c. a ton was made to obtain orders wanted. Malleable is dull and there are now no new inquiries out for basic. Based on freight rates of $2.90 from Birmingham and $1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	$12.65 to $13.15
Southern coke, No. 2 f'dry and 2 soft.	12.15 to 12.65
Southern coke, No. 3 foundry	11.65 to 12.15
Southern No. 4 foundry	11.15 to 11.65
Southern gray forge	10.65 to 11.15
Ohio silvery, 8 per cent. silicon	16.01 to 16.26
Southern Ohio coke, No. 1	15.01 to 15.51
Southern Ohio coke, No. 2	14.01 to 14.51
Southern Ohio coke, No. 3	13.76 to 14.01
Southern Ohio malleable Bessemer	14.26
Basic, Northern	14.26
Lake Superior charcoal	15.25 to 17.25
Standard Southern carwheel	26.90 to 27.40

(*By Mail*)

Coke.—The foundries are buying a few carload lots for prompt shipment, but they are not disposed to contract ahead. Most agencies do not look for much contract business until well along in April. Furnace coke is moving on contracts to those furnaces now in operation at about the usual rate, but no new business is in sight. Furnace coke is quoted at $1.50 to $1.65 per net ton in all three fields and foundry coke at $2 to $2.50.

Finished Material.—There is a limited demand for galvanized and black sheets, and the mills are not anxious to take on much business for the former, even at present quotations, because of the uncertainty as to the spelter situation. For prompt shipment only No. 28 galvanized sheets are quoted at 3.40c., Pittsburgh, while No. 28 black sheets range from 1.85c. to 1.90c. A little more interest is being taken in reinforcing concrete bars, but no large contracts have been closed lately. We quote steel bars and small structural shapes, from local warehouse stocks, at 1.80c. to 1.85c. Railroad track material is quiet.

Old Material.—The consumption of scrap in this immediate vicinity is very much curtailed, as the nearby rolling mills are understood to have a large quantity on hand. The foundries are melting at a fair rate, but the total tonnage consumed is not large enough to affect the market. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton

Bundled sheet scrap	$6.75 to $7.25
Old iron rails	11.00 to 12.00
Relaying rails, 50 lb. and up	19.75 to 20.25
Rerolling steel rails	9.75 to 10.25
Melting steel rails	9.00 to 9.50
Heavy melting steel scrap	9.00 to 9.50

Per Net Ton

No. 1 railroad wrought	$8.50 to $9.00
Cast borings	4.50 to 5.00
Steel turnings	4.50 to 5.00
Railroad cast scrap	9.50 to 10.00
No. 1 machinery cast scrap	10.25 to 10.75
Burnt scrap	6.50 to 7.00
Old iron axles	14.00 to 14.50
Locomotive tires (smooth inside)	9.00 to 9.50
Pipes and flues	6.00 to 6.50
Malleable and steel scrap	7.00 to 7.50
Railroad tank and sheet scrap	5.00 to 5.50

Cleveland

CLEVELAND, OHIO, March 16, 1915.

Iron Ore.—No interest is yet being shown in the ore market, aside from a few reservations previously noted, and a buying movement is not looked for before the opening of the navigation season. We repeat 1914 prices as follows: Old range Bessemer, $3.75; Mesaba Bessemer, $3.50; old range non-Bessemer, $3; Mesaba non-Bessemer, $2.85.

Pig Iron.—A reduction in price on Southern foundry iron to $9.50 Birmingham for No. 2 for the last half has resulted in the placing of a fair volume of business for that delivery. One agency has sold about 4000 tons in lots of 1000 tons and under in this territory at that price, and has made other sales aggregating about 10,000 tons in all. While this seller has withdrawn the open $9.50 quotation, Southern iron for the last half can still be bought at this price, and $9.50 can probably be shaded for prompt shipment iron. There is little inquiry for Northern iron. Consumers are as yet not showing any desire to cover for the last half. Prices are not firm and competition is bringing out a low price which is fairly uniform, minimum quotations of about $12.50 for No. 2 being made by Lake, Valley and northern Ohio furnaces. We quote, delivered Cleveland, as follows:

Bessemer	$14.55
Basic	13.45
Northern No. 2 foundry	13.50
Southern No. 2 foundry	13.50
Gray forge	13.00
Jackson Co. silvery, 8 per cent. silicon	$16.62 to 17.12
Standard low phos. at furnace	19.75 to 20.00

Coke.—The market is inactive. Furnace coke is quoted at $1.50 to $1.60 per net ton at oven for prompt shipment. We quote standard makes of foundry coke at $2.15 to $2.50.

Finished Iron and Steel.—Mills are getting a moderate volume of specifications on contracts and some business in small lots is coming out at the advance in prices. Prices are firm at 1.15c., Pittsburgh, for steel bars and structural material, but the 1.10c. price on plates can still be had from one or two of the smaller mills. Before the advance in prices March 1 protection on some business was given at the 1.10c. price until March 15, and in some cases this protection has been extended until April 1. The Carnegie Steel Company has taken 4000 tons of plates and shapes for a Lake boat placed with the American Shipbuilding Company and other boat inquiries will require about 10,000 tons. A Cleveland manufacturer has placed 700 tons of bars

for shrapnel shells and a local inquiry is pending for 36,000 tons of steel for export to France for making shrapnel cases. The Jones & Laughlin Steel Company has taken the steel and fabricating contract for the Citizens National Building, Evansville, Ind., requiring 600 tons. The Donovan Wire & Iron Company, Toledo, has taken 200 tons for the Detroit school, in Toledo. An inquiry is pending for 115 tons for a Masonic Temple in Lakewood, Ohio. Bids will be received tomorrow for a contract in connection with the new filtration plant in Cleveland, involving 300 tons of reinforcing bars. Demand for reinforcing bars is not active but considerable improvement is expected with the approach of spring. Sheet bars are more active. We note the sale of several lots, aggregating 10,000 tons to Ohio mills at $20, Youngstown, for April delivery. Black sheets continue irregular, quotations being made down to 1.70c., Ohio mills, for No. 28, with some mills asking 1.80c. to 1.85c. Galvanized sheets are quoted at 3.40c. to 3.50c. for No. 28 and blue annealed at 1.30c. to 1.35c. The demand for iron bars is light, but prices are much firmer. We quote bar iron at 1.10c. to 1.25c., Cleveland, the latter price being for local delivery. Warehouse prices are 1.80c. for steel bars and 1.90c. for plates and structural material.

Bolts, Nuts and Rivets.—The bolt and nut market is firm and specifications on contracts have improved. Makers are closing contracts with jobbers for the second quarter at prevailing prices. Rivet prices are steady at 1.50c., Pittsburgh, for structural and 1.60c. for boiler rivets, with quotations $1 a ton lower for round lots. Bolt and nut discounts are as follows: Common carriage bolts, ⅜ x 6 in., smaller or shorter, rolled thread, 80 and 20 per cent.; cut thread, 80 and 15 per cent.; larger or longer, 80 per cent.; machine bolts with h.p. nuts, ⅜ x 4 in., smaller or shorter, rolled thread, 85 per cent.; cut thread, 80 and 20 per cent.; larger or longer, 80 and 5 per cent.; coach and lag screws, 85 and 5 per cent.; square h.p. nuts, blank or tapped, $6.50 off; hexagon h.p. nuts, blank or tapped, $7.40 off; c.p.c. and t. square nuts, blank or tapped, $6.20 off; hexagon ⅝ in. and larger, $7.50 and $7.75 off; 9/16 in. and smaller, $8 and $8.25 off; semi-finished hexagon nuts, ⅝ in. and larger, 85, 10, 10 and 5 per cent.; 9/16 in. and smaller, 85, 10, 10 and 10 per cent.

Cast-Iron Pipe.—The U. S. Cast Iron Pipe & Foundry Company was the successful bidder on 12,700 tons for Cleveland, its bid being $22.50 per ton, at its Cleveland plant. On 560 tons of castings this company was low at $60 a ton for 22 to 72 in., and the Bowler Foundry Company was low at $49 per ton for 3 to 16-in. castings. The United States Company is the low bidder on 2500 tons of cast-iron pipe for Akron, Ohio, the contract for which has not yet been awarded.

Old Material.—The scrap market has quieted down and shows a weakening tendency. Valley mills which bought quite heavily recently are out of the market and there is little local inquiry. The softening in prices is attributed both to the absence of new demand and to the large amount of material placed on the market by the railroads early in the month, when prices were firm. The price on heavy steel scrap has declined in Youngstown to $11-$11.50. Local quotations are generally unchanged except busheling, which is down 25c. a ton. The Michigan Central Railroad has a list out, to be closed March 19. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton

Old steel rails, rerolling	$11.00 to $11.75
Old iron rails	12.00
Steel car axles	13.25 to 13.50
Heavy melting steel	10.00 to 10.50
Old carwheels	10.25 to 10.75
Relaying rails, 50 lb. and over	22.50
Agricultural malleable	8.00 to 8.50
Railroad malleable	10.25 to 10.50
Light bundled sheet scrap	8.00 to 8.50

Per Net Ton

Iron car axles	$16.00 to $16.50
Cast borings	6.25 to 6.50
Iron and steel turnings and drillings	5.75 to 6.00
Steel axle turnings	6.50 to 7.00
No. 1 busheling new	8.50 to 8.75
No. 1 busheling old	8.25 to 8.50
No. 1 railroad wrought	10.00 to 10.25
No. 1 cast	10.00 to 10.50
Stove plate	8.25 to 8.50

St. Louis

ST. LOUIS, MO., March 15, 1915.

Pig Iron.—Demand in the past week has been lighter than for some time and new buying has been in small lots ranging from 100 tons down. The only large sale was one of 1000 tons of northern coke carwheel iron. A favorable phase consists in the increase in the specifications on existing contracts and a tendency to take pig iron that has been lying back of old contracts by request of the buyers.

Coke.—No new business appeared in the week, but shipments on contracts are increasing. By-product coke, St. Louis delivery, continues to be quoted at about $5.20.

Finished Iron and Steel.—The aggregate of the transactions in finished iron and steel products continues to increase slowly, while the temper of the buyers remains favorable to the recent advances in price. Small sales are the rule in structural material, bars, both ordinary and reinforcing, plates, etc. No contracts ahead are being made, but purchasers keep close to the market and buy frequently. Track fastenings continue in reasonably good request. For material out of warehouse a strong demand exists. We quote for delivery out of stock as follows: Soft steel bars, 1.70c.; iron bars, 1.65c.; structural material, 1.80c.; tank plates, 1.80c.; No. 10 blue annealed sheets, 2c.; No. 28 black sheets, cold rolled, 2.55c.; No. 28 galvanized sheets black sheet gauge, 3.75c., the last item being a slight recession from last week, due to the weakening tendency in spelter.

Old Material.—Scrap dealers continue rather optimistic as a result of an increase in inquiry though the individual specifications are rather small. Prices show no weakening tendency and the next movement is expected to be upward. Considerable material recently offered has not had a seriously depressing tendency. In relayers there is a very sharp demand with an inadequate supply available and higher prices. We quote dealers prices, f.o.b. St. Louis, as follows:

Per Gross Ton

Old iron rails	$10.50 to $10.75
Old steel rails, re-rolling	10.25 to 10.50
Old steel rails, less than 3 feet	11.50 to 12.00
Relaying rails, standard section, subject to inspection	21.00 to 23.00
Old carwheels	10.25 to 10.50
No. 1 railroad heavy melting steel scrap	9.50 to 9.75
Shoveling steel	8.75 to 9.00
Frogs, switches and guards cut apart	9.75 to 10.00
Bundled sheet scrap	6.00 to 6.25

Per Net Ton

Iron angle bars	$10.75 to $11.00
Steel angle bars	9.00 to 9.25
Iron car axles	15.00 to 15.50
Steel car axles	10.75 to 11.00
Wrought arch bars and transoms	11.25 to 11.50
No. 1 railroad wrought	8.25 to 8.50
No. 2 railroad wrought	8.00 to 8.25
Railroad springs	8.75 to 9.00
Steel couplers and knuckles	9.00 to 9.25
Locomotive tires, 42 in. and over, smooth inside	9.00 to 9.25
No. 1 dealers' forge	7.50 to 7.75
Mixed borings	5.25 to 5.50
No. 1 busheling	7.75 to 8.00
No. 1 boilers, cut to sheets and rings	6.25 to 6.50
No. 1 railroad cast scrap	9.50 to 10.00
Stove plate and light cast scrap	8.00 to 8.25
Railroad malleable	7.25 to 7.50
Agricultural malleable	6.75 to 7.00
Pipes and flues	6.25 to 6.50
Railroad sheet and tank scrap	6.25 to 6.50
Railroad grate bars	7.50 to 7.75
Machine shop turnings	5.75 to 6.00

Birmingham

BIRMINGHAM, ALA., March 15, 1915.

Pig Iron.—While stock accumulations in the Alabama iron yards were reduced 20,000 tons in February, one concern sold in that month 60,000 tons against a two-furnace monthly output of 16,000 tons, and while the inquiry from Europe for wire, billets and iron continues strong, the situation is still without features to breed the optimism that was recently inspired by foreign and domestic purchases. The market level is still around $9.50, any iron selling above this figure being in the special class. In fact, it is known that iron has been sold right in this district below $9.50 and apparently as low as $9.25 has been done by one concern. There is little remaining disposition to ask higher prices for third quarter delivery or, indeed, for the

remainder of the year, while the consumer hesitates to buy forward metal at prevailing prices. Southern foundries, outside the big pipe shops, have not increased operations to any extent and are still slow in taking iron. One concern has in its yards over 20,000 tons of iron on which deliveries have been held up; with others doubtless such stocks are in proportion. While one interest reduced stocks considerably last month, there is still over 400,000 tons of all kinds of iron on the yards. Movements, however, are good on iron ordered for eastern and western consumption and yard iron bids fair to be further reduced this month. Steel operations will continue on the same basis as has existed for six weeks, which means steady going in the rail and billet mills of the Tennessee company at Ensley and the wire mill of the American Steel & Wire Company at Fairfield. Steel is much stronger than pig iron. The foreign business is still greatly handicapped by a scarcity of ships and high freight rates. For instance, an ocean rate from Mobile to Great Britain recently quoted is $7, as compared with $3 in 1898 when Alabama first commenced to ship iron abroad. However, an order for 500 tons for delivery in Italy was booked at $9.50 f.o.b. furnace. It is easy to see how quickly Alabama yards would empty with an adequate supply of ships and the return of normal freight rates. Among the Southern foundries which are working on short time are stove foundries, which are on a 25-per cent turn. The volume of current business is not great. We quote per gross ton, f.o.b. Birmingham furnaces, as follows:

No. 1 foundry and soft	$10.00 to $10.25
No. 2 foundry and soft	9.50 to 9.75
No. 3 foundry	9.00 to 9.25
No. 4 foundry	8.75 to 9.00
Gray forge	8.50 to 8.75
Basic	9.50 to 10.00
Charcoal	22.50 to 23.00

Cast-Iron Pipe.—The manufacturers of water pipe are enjoying a good business so far as output is concerned, although it is understood that many contracts have been taken at prices under quotations. This activity is understood to be due to the liberality with which municipalities are being supplied with money on bond issues with which to make improvements. On the other hand, the makers of soil pipe have recently declined to take iron ordered on time, due to a disappointing income of orders. We quote per net ton f.o.b. pipe shop yards as follows: 4-in., $20;6-in. and upward, $18, with $1 added for gas pipe.

Coal and Coke.—The coal business in Alabama is unchanged, the operations being on a 50 per cent. basis It is still believed that the Interstate Commerce Commission will decline to grant the increase in rates to New Orleans asked by the railroads. The Warrior river field will be open to Mobile by April, when the gates in lock 17 will have been placed. Coke is a fair seller westward and prices are maintained. We quote, per net ton, f.o.b. oven, as follows: Furnace coke, $2.75 to $3; foundry, $3.20 to $3.40, with special brands a little higher.

Old Material.—The scrap market is irregular, although the volume of business is greater than it was early in the year. Prices are not maintained, but dealers' quotations per gross ton, f.o.b. yards, are as follows:

Old iron axles	$13.00 to $13.50
Old steel axles	12.50 to 13.00
Old iron rails	12.00 to 12.50
No. 1 railroad wrought	8.50 to 9.00
No. 2 railroad wrought	7.50 to 8.00
No. 1 country wrought	8.00 to 8.50
No. 2 country wrought	7.00 to 7.50
No. 1 machinery cast	9.50 to 10.00
No. 1 steel scrap	8.00 to 8.50
Tram carwheels	8.50 to 9.00
Stove plate	8.00 to 8.50

The Chicago, Burlington & Quincy has ordered 50 locomotives from the Baldwin Locomotive Works, 15 of the Pacific type, 20 Mikado type and 15 Santa Fé type. The American Locomotive Company has received an order for 5 Pacific type locomotives from the Delaware, Lackawanna & Western. The Vandalia is reported to be inquiring for 25 consolidation type locomotives. The Missouri, Kansas & Texas and the Chesapeak & Ohio are also inquiring for 40 and 20 locomotives respectively.

San Francisco

SAN FRANCISCO, CAL., March 9, 1915.

With more favorable weather, a much better consuming demand through the country is expected shortly. Thus far, however, distributive trade has not been revived, and some large consuming industries are keeping practically out of the market. Merchants accordingly hesitate to specify in excess of requirements, notwithstanding the stiffening of prices; and, except for galvanized products, business consists principally of scattering orders for special purposes.

Bars.—The demand for reinforcing material is extremely light, with little in prospect except a few country bridges. General jobbing trade is scarcely up to expectations, and few special inquiries are appearing. Advancing freight rates and mill prices have caused but little stimulation in specifications, and new business, either for prompt shipment or second quarter, is very light. Bars cannot now be landed here via the Panama Canal at much below 1.72½c., and the local price on carloads for prompt delivery from store or mill has been advanced to about 1.75c.

Structural Material.—Fabricating contracts show some increase, and the outlook for new inquiries is more promising than for some time, though local building is by no means active. Of the Government radio towers, six will be built by the Llewellyn Iron Works, Los Angeles, and three by the Des Moines Bridge & Iron Company. The Pacific Rolling Mill, this city, has a small postoffice job in southern Oregon, and the Western Iron Works has a small tonnage for the Academy of Sciences Building in Golden Gate Park, this city. The McClintic-Marshall Construction Company has taken about 200 tons for a building in Oakland. The Union Iron Works has just received bids for fabricating some 800 tons for a marine ways, plain material for which is on hand. Bids are being taken for a small job at the State prison at Folsom and plans are expected shortly for the University of California Hospital. Local fabricators are specifying very little beyond work already in hand or well assured. The Pacific Coast Steel Company is now rolling angles up to 4 x 6 in., in addition to its former output of bars.

Plates.—Some additional marine business has been placed, but none of great importance. The Shell Oil Company has placed a contract for several tanks with the Wilamette Iron & Steel Works, Portland, Ore., requiring nearly 1200 tons of plates and heavy sheets. Specifications are nearly ready for the Sacramento water system, which will require a considerable tonnage of riveted pipe. Small jobbing trade shows little improvement, and merchants' specifications, though holding up fairly well, are not increasing.

Sheets.—Local agents are now generally holding to the basis of 3.40c., Pittsburgh, for galvanized sheets, and will take only small orders at that, while some are asking 3.50c. There is not much buying at the new prices, though some who failed to cover their requirements earlier are coming into the market. Specifications continue fairly heavy. Distributive business is also active.

Wrought Pipe.—The jobbing movement is still held up by weather conditions, though there is somewhat more inquiry from the country, and more activity is expected within a few weeks. Mill agents still report a fair volume of merchants' orders, though this movement is hardly as active as it was recently, as there is no desire to pile up large stocks. A few special inquiries are appearing, but nothing of much importance, and there is no new demand from the oil fields.

Cast-Iron Pipe.—The town of Long Beach takes bids March 10 for about 1300 tons, and the Mare Island Navy Yard is in the market for 60 tons. It is expected that a rather large tonnage will be wanted for the Sacramento waterworks, for which specifications are nearly ready.

Pig Iron.—The general foundry trade locally shows no perceptible improvement, and very few melters are in the market, most of them having considerable stock on hand. A large tonnage still remains in the hands of importers. Prices show a wide range, and are too irregular to warrant definite quotations.

Coke.—Stocks continue rather heavy, and there has not yet been much demand, though a few good-sized inquiries have appeared lately at outside points. An increasing demand is anticipated, as there is not much foreign coke coming this way at present. Good foundry coke at local yards is quoted at about $12.50 per net ton, and English coke to arrive at $11 to $12 per gross ton.

Old Material.—Cast-iron scrap continues to move in small lots at an average price of about $15 per net ton. Prices range as much as $1 up and down from this figure, varying rather with terms and conditions of sale than with quality of material. Some small lots of steel scrap have been purchased by foundries at about $8 per gross ton, but the larger consumers are not in the market, and that price could hardly be obtained for any considerable tonnage.

New York

NEW YORK, March 17, 1915.

Pig Iron.—The leading pump manufacturer is in the market for 1250 tons of foundry iron for the New Jersey plant and 100 tons for a New England branch, after having bought 100 tons for a third works. In this immediate territory the foundry iron market has shown no change in the last week, but in New York State, particularly in the western half, there has been more stir. Indications are that a number of foundries are ready to buy again, while transactions already have been considerable. It would not be a surprise to see two or three weeks of more activity than has been noticed this year—one of those small waves of buying which seem to come at intervals of three to five months. Among the results of this greater activity in New York State is the shading of the prices which ostensibly have held in the Buffalo district. Some sales have been made as low as $12.50 for No. 2 X at Buffalo and $12.75 is also reported. The offering of a new brand of foundry iron in New England, the product of a Buffalo interest, is an incident of the past week or two. Furnaces in eastern Pennsylvania have given little encouragement to representatives of ore companies who have called on them lately. There is no indication of a larger operation of furnaces in that section and the probabilities that little iron ore will come overseas in the next six months has caused as yet no such turning to Lake Superior supplies as has been expected in some quarters. We quote as follows at tidewater: No. 1 foundry, $14.50 to $15; No. 2 X, $14.25 to $14.50; No. 2 plain, $14 to $14.25; Southern, $14.50 for No. 1 and $14 to $14.25 for No. 2.

Ferroalloys.—Cable advices in the past week from British producers of ferromanganese to their representatives here state that they expect soon to ship the alloy and will cable details later. How much will be allowed to come and when it will arrive is as uncertain as ever. All rests with the British government, producers being ready and eager to make shipments. In the meantime sales are being made here at $78, seaboard, contingent upon ability to furnish the material. Most of the contracts cover only the second quarter at this quotation. When supplies are received, however, it is understood that they will apply on recent merged contracts. Reports of sales of spot material at $100 to $125 are reported as well as some by the Carnegie Steel Company to consumers very much in need of small lots. The British declaration of a virtual blockade of German ports is cited as ground for the immediate unconditional lifting of the embargo on ferromanganese. A little spiegeleisen has been imported, and the domestic product is normal in demand. It is understood that an Eastern merchant has arranged with a producer of electrolytic alloys to have Brazilian manganese ore converted into 80 per cent. ferromanganese, which it is planned to have on the market in May. Ferrosilicon, 50 per cent, is in good demand at $71 to $73, Pittsburgh.

Structural Material.—About 6500 tons of steel work for fabrication has been closed since last week among the relatively larger jobs in this section, and in addition the Chesapeake & Ohio has placed the Sciotoville bridge, involving 15,000 tons, with the McClintic-Marshall Company. The decision in the last case, after months of delay, and coming from a railroad, offers some encouragement. New projects have not, however, come to light in sufficient volume to replace the work settled, and while considerable steel building work is under consideration the immediate situation represents a slight setback. Plain material is weak, and not only is 1.10c., Pittsburgh basis, done but even this has been shaded on new sales. Not so much work was put under contract in February as expected, the report of the Bridge Builders' and Structural Society showing that 30 per cent. of the capacity of the country's shops were contracted for in that month, or at the rate which has obtained since August 1, when the European war broke out. March bookings will of course raise this figure materially. The Hinkle Iron Company took the bulk of the building work let in the East, including 800 tons for the D. & M. Realty building, 116 East Twenty-seventh street; 1250 tons for the Brokaw building, Forty-second street and Broadway; 500 tons for the Palmer apartments, Riverside Drive and Ninety-sixth street, and 500 tons for the Surrey apartments, 114 East Eighty-fourth street. The Levering & Garrigues Company took 300 tons for a factory at Bridgeport for Handy & Harman, for rolling silver sheets and 500 tons for alterations to a warehouse, Eleventh avenue and Twenty-eighth street. Other contracts embrace 600 tons for the Southern Railway to the Virginia Bridge & Iron Works; 450 tons for turbine foundations for the Essex power house, Newark, to the Pennsylvania Steel Company; 250 tons for a lift bridge at Tampa for the Atlantic Coast Line; and about 425 tons, mostly for theaters, including the Colonial in Boston and one at Lynn, taken by the Atkins Structural Engineering Company, Brooklyn. Among new railroad offerings is 200 tons for the Long Island for a pier shed, East Thirty-fourth street, and 200 tons for the Pennsylvania for a number of bridges. One new building project—the Waite warehouse, Webster avenue and 175th street—involves 900 tons, and the West End brewery, Utica, will take 250 tons. Movement out of warehouse has slackened somewhat. We quote mill shipments at 1.10c. to 1.15c., Pittsburgh, or 1.269c. to 1.319c., New York, and from store, 1.85c. to 1.90c., New York.

Plates.—Scarcity of ships is interfering with export business. It is estimated that covering all commodities there are 50,000 tons of American products and manufactures in New York harbor without ships to receive them. On top of this is a wide range in steel prices for export. Taking the export freight rate from Pittsburgh to New York at 11.3c. the expected delivered quotation would be 1.213c., New York, while prices of 1.175c. have been made and 1.16c. claimed. No improvement has developed in railroad cars. The Missouri, Kansas & Texas is expected to settle shortly on its purchases of 1000 freight cars and 200 general service cars, and other pending business includes 15 cars for the New York, Westchester & Boston, 10 cars for the Wilkes-Barre & Hazleton and 10 cars for the Lehigh Traction Company. The Santa Fé has placed its 500 refrigerator cars with the American Car & Foundry Company, which is to build 76 ventilated box cars for the New York, Philadelphia & Norfolk. This last road has placed two passenger cars with the Pressed Steel Car Company. We quote steel plates at 1.10c. to 1.15c., Pittsburgh, or 1.269c. to 1.319c., New York, and from store, 1.85c. to 1.90c., New York.

Steel and Iron Bars.—Several cases were learned of large buyers trying to close for steel bars at 1.10c. and 1.12½c., Pittsburgh, under the belief that this is the market, but they were unsuccessful, and the purchases were made at 1.15c. The steel bar business is clearly in strong hands and the market is holding well. Specifications continue in fair volume, but new business is very small, as it has been in the last few weeks. Some contracts have been closed at 1.20c. for the second quarter, but these are largely for jobbers who express a desire to see stronger prices. The mixed condition of the market is indicated in the range of quotations made for shafting. In carload lots discounts range from 65 to 70 per cent., while for less than carload lots the range is 60 to 65 per cent. We quote mill shipments of steel bars at 1.15c., Pittsburgh, or 1.319c., New York, and refined iron bars 1.20c. to 1.25c., New York. Out of store in New York we quote iron and steel bars at 1.80c. to 1.85c.

Cast-Iron Pipe.—The demand is considered normal for the time of year. Quite a volume of general buying is in progress, but no large transactions are coming out. Harrisburg, Pa., will purchase a small quantity of pipe March 22. Lancaster, Pa., will open bids March 30 for its requirements for the coming year. Bloomfield, N. J., will let a small lot April 5. Prices continue about as they have been, carload lots of 6-in. being available at $20 to $20.50 per net ton, tidewater.

Old Material.—Heavy melting steel scrap has shown more strength, due to moderate buying by steel companies in eastern Pennsylvania, but possibly to a larger extent to the disposition of dealers to purchase more freely. The market in eastern Pennsylvania has latterly been somewhat out of line with the Pittsburgh market and indications are that Eastern prices will be brought up to the usual parity. Business in the general list of old material is showing some improvement as compared with a month ago, but quantities moving are not large. Dealers' quotations, per gross ton, New York, are as follows:

Old girder and T rails for melting	$8.75 to	$9.00
Heavy melting steel scrap	8.75 to	9.00
Relaying rails	19.00 to	19.50
Rerolling rails (nominal)	9.00 to	9.50
Iron car axles (nominal)	15.50 to	16.00
Steel car axles (nominal)	12.00 to	12.50
No. 1 railroad wrought	10.50 to	11.00
Wrought-iron track scrap	9.50 to	9.75
No. 1 yard wrought, long	9.50 to	9.75
No. 1 yard wrought, short	8.75 to	9.00
Light iron	3.50 to	4.00
Cast borings	6.00 to	6.25
Wrought turnings	6.25 to	6.75
Wrought pipe	8.00 to	8.25
Carwheels	9.50 to	9.75
No. 1 heavy cast, broken up	10.50 to	11.00
Stove plate	7.75 to	8.00
Locomotive grate bars	7.00 to	7.50
Malleable cast	7.25 to	7.75

Buffalo

BOSTON, MASS., March 16, 1915.

Old Material.—New England dealers and producers see little change in the situation. The reported tendency toward higher prices for steel in the Pittsburgh district does not seem to have influenced the local market, except perhaps to stiffen it to a certain extent. Local transactions are on a hand-to-mouth basis. The quotations given below are based on prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points which take Boston rates from eastern Pennsylvania points. Mill prices are approximately 50c. per ton higher.

Heavy melting steel	$8.25 to	$8.50
Low phosphorus steel	13.75 to	14.75
Old steel axles	12.75 to	13.25
Old iron axles	20.25 to	20.75
Mixed shafting	12.00 to	12.25
No. 1 steel wrought and soft steel	8.25 to	8.75
Skeleton (bundled)	5.50 to	5.75
Wrought-iron pipe	7.00 to	7.50
Cotton ties (bundled)	5.25 to	5.75
No. 2 light	3.25 to	3.75
Wrought turnings	5.00 to	5.50
Cast borings	5.00 to	5.25
Malleable	7.50 to	7.75
Stove plate	7.00 to	7.50
Grate bars	5.25 to	5.50
Machinery cast (price to consumers)	11.25 to	11.50

The Cleveland Galvanizing Works Company, East Cooper avenue and Pennsylvania Railroad, Cleveland, Ohio, has purchased the chain business of the Boker Cutlery & Hardware Company, Inc., formed to succeed Herman Boker & Company, New York City. The purchase includes the patents, good will, etc., and the equipment for the manufacture of the Boker flat link chain and specialties at the Valley Forge plant which is now being moved to Cleveland. All correspondence regarding the chain should be sent to Cleveland.

The Union Rolling Mill Company, Cleveland, Ohio, has placed orders for its crane equipment in connection with its new merchant bar mill. A 40-ton mill crane and a 5-ton shop crane will be furnished by the Toledo Bridge & Crane Company. The Cleveland Crane & Engineering Company will furnish two 10-ton cranes.

British Market Higher

Pig Iron Excited—More American Steel Sold—Rail Business Bright

(By Cable)

LONDON, ENGLAND, March 17, 1915.

Pig iron warrants are active and excited on growing costs and fears of furnaces being blown out owing to famine prices of fuel. Furnaces in blast number 165 against 171 a year ago. Stocks of pig iron in Connal's store are 127,608 tons against 124,998 tons one week ago. Actual trade buying is limited.

The demand is good for semi-finished steel and prices tend upward. American blooms are sold at 125s. ($30.42) c.i.f. for Manchester, and rods at 145s. ($35.28) f.o.b. New York. Steel plates are being sold very cheaply c.i.f. Japan. There is more inquiry for rails including 40,000 tons for South Africa. A large Russian business is expected which would fill up all the British rail mills. Demand is better for tin plates. We quote as follows:

Tin plates, coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 16s. ($3.89), against 15s. 6d. ($3.77) last week.

Cleveland pig iron warrants, 61s. 2d. ($14.88) against 57s. 11d. ($14.09) last week.

No. 3 Cleveland pig iron, makers' price, f.o.b. Middlesbrough, 61s. 6d. ($14.96), against 58s. 6d. ($14.24) last week.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £10 10s. ($51.09), against £9 ($43.79) last week.

Steel ship plates, Scotch, delivered local yards, £9 ($43.79), against £8 15s. ($42.58) a week ago.

Steel rails, export, f.o.b. works port, £7 5s. ($35.28), against £7 2s. 6d. ($34.67) last week.

Hematite pig iron, f.o.b. Tees, 92s. 6d. ($22.51), compared with 90s. ($21.89) last week.

Sheet bars (Welsh), delivered at works in Swansea Valley, £7 ($34.06), against £6 15s. ($32.85) a week ago.

Steel joists, 15 in., export, f.o.b. Hull or Grimsby, £8 15s. ($42.58), against £8 10s. ($41.36) last week.

Steel bars, export, f.o.b. Clyde, £8 15s. ($42.58).

Ferromanganese, f.o.b. £15 10s. ($75.42).

Pig-Iron Output Very Small—The Hostile Attitude of Labor

(By Mail)

LONDON, ENGLAND, March 5.—Pig-iron output is kept down to the smallest extent and the deliveries are very small, the Cleveland shipments for February being only 16,888 tons, against 19,110 tons the previous month and 96,000 tons in February last year. For the two months, January and February, the total was only 36,000 tons, of which 8500 tons went to the home trade and 27,500 tons overseas. There is no chance of things getting much better in the near future, for labor is scarcer than ever, and all energies are being concentrated upon the pursuit of the war. The ore position seems to be a little better and prices are below the top figures paid, the result being that hematite iron is a little cheaper, but any radical alteration in the position is improbable for some time. The Government has been releasing interned steamers and facilitating the employment of home-bound state-chartered vessels, but the actual relief to be obtained in this way is small, and at the end of the trip there is the British working man to be considered—and his idea of work just now is of a highly humorous order.

Some American semi-finished steel is offered by independent producers and a few thousand tons of sheet bars and billets have been sold to the west coast at up to 120s. ($29.20)—c.i.f. Liverpool. There is nothing more to be had at the price today, sellers asking 125s. ($30.42)—though they might be prepared to accept less. There is no doubt that consumers are poorly provided with material at this juncture, but on the other hand the demand for galvanized sheets and

tin plates is exceedingly small. It is difficult to ascertain what the leading interest is doing here, but there does not appear to be much disposition at the moment to force material on the market. British works are very firm, and Welsh bars are not now to be had at anything below 135s. ($32.85)—delivered in the district.

LABOR ATTITUDE HOSTILE

In finished steel an exceedingly firm tone prevails, and there is not the least chance of prices being weakened materially yet awhile. Machinery is hard put to it to turn out what is wanted, for men are very scarce and all with one accord are out to do as little work as possible. The British workmen are indeed the object just now of unmitigated contempt, basely choosing, as they have done, a great national crisis to stop work upon the production of ammunition and armament, in a tricky attempt to force employers' hands. The main cause of the higher cost of living here is the general refusal of men to do a decent day's work. If the "blighters" engaged upon discharging ships would do the work they were paid to do, food prices would not have been raised so. Similar conditions obtain on the railroads, where the men seem to imagine that they are only expected to look on, while in the ammunition and armament plants the performance of the duties for which the men are paid is apparently the last thing to be considered. Some of the wasters manning our engineering shops, now shamed into resuming "work," have coupled to their return the condition that they will not do any overtime at all, and that failing the speedy and unconditional surrender of the employers, they will undertake a "stay in" strike or in other words will not absent themselves, but will "play" the ca' canny policy over again. With output deliberately interrupted by all sorts of trade union tricks, prices are naturally firm and it is a great pity freights are so high that there cannot be an influx of foreign material on a scale that would help to bring some of the men to their senses.

Metal Market

NEW YORK, March 17, 1915.

The Week's Prices

Cents Per Pound for Early Delivery

	Copper, New York			Lead		Spelter	
Mar.	Lake	Electrolytic	Tin, New York	New York	St. Louis	New York	St. Louis
10	15.25	14.75	44.00	3.95	3.87½	10.50	10.00
11	15.25	14.75	46.00	3.95	3.87½	10.00	9.00
12	15.25	14.75	49.37½	3.95	3.87½	9.50	8.87½
13	15.25	14.75	.....	3.95	3.87½	9.50	9.00
15	15.25	14.75	51.00	3.95	3.87½	9.50	9.00
16	15.25	14.75	52.50	4.10	4.00	9.62½	9.12½

Copper is easier; otherwise conditions are unchanged. Spot tin is scarce and has again advanced above 50c. Lead has advanced $3 a ton. Spelter has slumped and prices are entirely nominal. Antimony is higher and the quotations for English grades are nominal.

New York

Copper.—In general, conditions have changed very little. The activity at the mills is based almost entirely on the war demand for brass rods, cartridge brass, disks, etc. Lake is quoted at 15.25c. to 15.50c. for prime brands, with less desirable grades selling down to 15c. Electrolytic is generally quoted at about 14.75c., cash, New York, although the light domestic business has brought out limited quantities of re-sale metal at 14.62½c., cash. Exports this month total 16,639 tons.

Tin.—The growing scarcity of spot metal is causing a great deal of concern and has caused prices to advance radically, until yesterday sales were made at 52.50c. In the last week business has been almost entirely in small lots and then only where consumers found that buying was absolutely necessary. Since the first of the month the arrivals from London total only 80 tons, which is most unusual. Cables received yesterday did not indicate that more than this quantity was afloat from that port, and if metal is to arrive from London for delivery in this month sailings cannot be made later than to-day. There is some Banca tin in the market and liberal shipments are on the way from the Far East, but there is more or less uncertainty as to tin from the latter source. The steamer Shimosa from Singapore, with 550 tons aboard, is still understood to be undergoing repairs at Malta. Altogether there is 3365 tons afloat but a good part of this is not due to arrive until late in March.

Lead.—The American Smelting & Refining Company yesterday advanced its price $3 per ton to 4.10c. per lb., New York. The advance was based upon the strength in London, where there was an advance of £1 per ton yesterday. Contrary to conditions abroad, where the demand continues good, the domestic consumption is light and unsatisfactory. More metal could be sent abroad if it were possible to obtain cargo space with any ease. Exports this month total 1995 tons.

Spelter.—About the middle of last week there was a slump in spelter which entirely upset the market, aroused uncertainty in the minds of consumers and has made prices absolutely nominal. Charges of gross manipulation have been made, it being alleged among other things that on the part of certain interests there has been more desire to break the market than to sell at any price. Representatives of producers insist that there is no spot or nearby metal available and that the recent advance to record-breaking prices was legitimately founded on the unprecedented export demand as well as the good demand for brass mill special in this country. Of course, it must be understood that choice grades, such as the brass mills use, are quoted higher than ordinary prime Western. There was an actual sale yesterday of brass mill special spelter for export, May delivery, at 12c. The quotations for spot yesterday were nominally 9.62½c., New York, and 9.12½c., St. Louis, although some sellers made the nominal quotations of 10c. and 9c., respectively. Exports this month total 3874 tons.

Antimony.—Quotations for English brands are almost purely nominal, as the scant supply here is growing tighter every day. Practically all of the business is in Chinese antimony. Nominal quotations are 28c. for Cookson's and 27c. for Hallett's, but Chinese can be had at 21c., duty paid. The market is quiet.

Old Metals.—The market continues quiet. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	13.50 to 13.75
Copper, heavy and wire	13.25 to 13.50
Copper, light and bottoms	12.25 to 12.50
Brass, heavy	9.50 to 9.75
Brass, light	7.50 to 7.75
Heavy machine composition	11.25 to 11.50
Clean brass turnings	9.50 to 9.75
Composition turnings	9.75 to 10.00
Lead, heavy	3.75
Lead, tea	3.50
Zinc, scrap	6.50

Chicago

MARCH 17—(*By Telegraph*).—Copper prices have been noticeably stiff and quotations from various sources are higher, but principal producers are still holding at the levels quoted. Even more confusion than has previously prevailed now exists in spelter market futures, which appear to be involving a speculative element. Spelter may be bought at decidedly lower prices, but for immediate shipment there is practically none to be had. We quote as follows: Casting copper, 14.50c.; Lake copper, 14.75c., for prompt shipment; small lots, ⅛c. to ¼c. higher; pig tin, carloads, 50.5c.; small lots, 52.5c.; lead, desilverized, 3.92½c., and corroding, 4.10c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, nominal; sheet zinc, price given by makers on request; Cookson's antimony, 26c., for cask lots; other grades, 20c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 11.75c.; copper bottoms, 10.25c.; copper clips, 11.50c.; red brass, 10.25c.; yellow brass, 8.25c.; lead pipe, 3.25c.; zinc,

7.25c.; pewter, No. 1, 25c.; tinfoil, 33c.; block tin pipe, 36c.

St. Louis

MARCH 15.—Spelter has taken a drop, the best price to-day being 10c., with a weakening tendency. Lead is held at 4.25c.; tin, 52c.; Lake copper, 15.50c.; electrolytic copper, 15.35c.; Cookson's antimony, 23c. In the Joplin ore district there was a sharp fall in zinc blende, from $73 per ton early in the week to a basis of $60 to $65. Calamine was weaker, selling on a basis of $35 to $40 for 40 per cent. Lead ore was higher, the price most commonly paid being $48. Miscellaneous scrap metals show the effect of the uncertainty in new metals and are quotable as follows: Light brass, 6c.; heavy yellow brass, 7.50c.; heavy red brass and light copper, 9.50c.; heavy copper and copper wire, 10.50c.; zinc, 5c.; lead, 3.50c.; tea lead, 5.50c.; pewter, 23c.; tinfoil, 26c.

Iron and Industrial Stocks

NEW YORK, March 17, 1915.

Stock prices have had some irregularity of movement in the past few days. Less effect was caused, however, by the sinking of an American ship by a German war vessel, with its possibility of complications with the German Government, than would reasonably have been expected. It was nevertheless effective in checking advances. Among unfavorable developments were the passing of dividends on preferred stock by the Sloss-Sheffield Steel & Iron Company and the Southern Railway Company. It is noteworthy that the subsidence of the upward movement in security prices brought with it no increase in trading, which indicates that holders of stocks are not disposed to liquidate. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chal., com.	9	Nat. En. & St., com.	10¾ - 13⅜
Allis-Chal., pref.	34 - 34½	Nat. En. & St., pref.	80
Am. Can, Com.	27 - 28¼	Pressed St'l, com.	26 - 28½
Am. Can, pref.	94¾ - 95	Pressed Stl., pref.	86 - 88
Am. Car & Fdy., com.	41 - 41½	Ry. Spring, com.	19¾ - 20½
Am. Car & Fdy., pref.	113 - 113⅝	Republic, com.	19½ - 19⅞
Am. Loco., com.	20⅝ - 21	Republic, pref.	76⅛ - 77
Am. Loco., pref.	75	Rumely Co., pref.	4¼
Am. Steel Fdries.	24¼ - 25½	Pipe, pref.	33¾
Bald. Loco., com.	30 - 32	U. S. Steel, com.	44½ - 45⅝
Bald. Loco., pref.	94 - 95	U. S. Steel, pref.	104¾ - 105⅝
Beth. Steel, com.	54¼ - 57⅞	West'gh'se Elec.	68¼ - 69½
Beth. Steel, pref.	105 - 105¼	Chic. Pneu. Tool.	47 - 47½
General Electric.	139 - 140⅝	Cambria Steel.	41¾ - 42½
Gt. No. Ore Cert.	30¾ - 32¾	Lake Superior Corp.	7
Int. Harv. of N. J., com.	93 - 95⅜	Cruc. Steel, com.	13 - 13⅜
Int. Harv. Corp., com.	70	Cruc. Steel, pref.	76⅞ - 77
Int. Harv. Corp., pref.	93	Harb.-Wk. Ref., com.	48
Lackawanna Steel.	29	Harb.-Wk. Ref., pref.	99
		La Belle Iron, pref.	106

Dividends

The American Iron & Steel Mfg. Company regular quarterly 1¼ per cent. on the preferred and common stocks, payable April 1.

The United Shoe Machinery Corporation, regular quarterly 1½ per cent. on the preferred stock, and 2 per cent. on the common stock.

The Willys-Overland Company regular quarterly 1¾ per cent. on the preferred stock, payable April 1.

The Sloss-Sheffield Steel & Iron Company has deferred action on the quarterly dividend on the preferred stock usually declared at this time. Dividends at the rate of 1¾ per cent. quarterly have been paid for years. The company has paid nothing on the common stock since December 1, 1909.

The Stark Rolling Mill Company, Canton, Ohio, announces the appointment of the Dearborn Steel & Iron Company as its selling agent in Chicago, northern Illinois and Wisconsin. The Dearborn Steel & Iron Company is a new company, composed of H. C. Perrine and E. L. Lyon, both of whom were formerly connected with Joseph T. Ryerson & Son. Mr. Perrine more recently was associated with the Fred Gardner Company. Offices have been opened in the Peoples Gas Building.

Changes in Electric Welding Products Company

At a meeting of the stockholders of the Electric Welding Products Company, Cleveland, Ohio, February 24, the name of the company was changed to the Steel Products Company. The new name was taken for the reason that it better fits the lines of work in which the company is now engaged. Its jobbing business in electric welding work and its equipment for the manufacture of cap screws, bolts and nuts for the machinery trade have been purchased by the Metals Welding Company, Cleveland, which will continue the manufacture of such products.

The Steel Products Company, under its old name, has been identified with the automobile, motorcycle, gas engine and machinery trade for the past twelve years. Its chief business at present is the manufacture of gas engine valve stems, or poppet valves, for all types of gas engines, and spring shackle bolts. The capital stock of the company has been increased from $250,000 to $1,000,000. It has recently completed an addition to its main plant and contracts have been let for three additional units, each 45 by 125 ft. A branch office has been opened in Detroit at 1515 Ford Building, in charge of Frank DeWitt who has been Michigan representative of the company for some time.

The officers of the Steel Products Company are: C. E. Thompson, president and general manager; W. D. Bartlett, vice-president and superintendent; J. A. Krider, secretary and sales manager, and G. H. Brown, treasurer.

Sweden in Need of Copper

The lack of copper in Sweden will eventually cause the shutting down of the big factories which depend on copper for their operation, according to Consul General Ernest L. Harris, of Stockholm, in Commerce Reports, writing February 9. The greatest consumers of copper in Sweden are the Nya A. B. Svenska Metallverken and Allmänna Svenska Electriska A. B., both factories situated in Vasteras; Nya Förenade Electrika A. B. Luth & Rosen, Max Sieverts Kabelfabrik, L. M. Ericssons Telefonfactory, etc., but there are also many others who use copper to a less degree, such as armature factories, petroleum works, stove factories, and shipbuilders. The prospects for Sweden's copper industries this year were very promising. Before the war the import of copper had been about 800 tons a month. Now that the import of copper has been restricted, only 762 tons has reached Sweden in the months of November and December, and 1775 tons of electro copper is being held in England. Factories cannot possibly run more than two months longer on the present supply.

Nova Scotia Steel & Coal Companys' Year

Canadian industrial companies last year fared about as badly as those on this side of the border. The Nova Scotia Steel & Coal Company has the reputation of being one of the best managed in Canada; but in spite of this the gross profits for the year ended December 31, 1914, were only $415,164, compared with $1,255,953 in 1913 and $1,000,609 in 1912. The general charges which had to be met were $814,284, making a deficit of $399,220 before dividends were deducted. As dividends were only paid for the first six months, the payments on this account were only $41,200 for the preferred and $180,000 for common, making a further deduction of $221,000, establishing a total deficit of $620,420. Since the turn of the new year trade conditions have improved.

The American Shipbuilding Company, Cleveland, Ohio, has taken an order for a lake freighter to be built for C. D. Bradley, Calcite, Mich. The boat will be used in the limestone and coal trade and will be operated in the interest of the Michigan Limestone & Chemical Company. It will be 555 ft. long, 60 ft. beam and 31 ft. deep.

Russell Wilson has been appointed temporary receiver for the American Mfg. Company, Indianapolis, Ind., maker of tools and machinery used in cement work.

PERSONAL

A. C. Dinkey, president Carnegie Steel Company, Pittsburgh, is confined to his home with a severe attack of the grippe.

A. H. Woodward, vice-president and general manager of the Woodward Iron Company, Birmingham, Ala., denies reports that his father, J. H. Woodward, founder of the company and its president, would retire and that he himself would become chairman of the board, while R. H. Banister, secretary, would be elected president. He says no changes are contemplated at this time. The next meeting of the directors will be held May 12. J. H. Woodward has been in declining health for some time.

I. Wolf, Jr., president of the American Chamber of Commerce and Trade of Berlin, Germany, is in this country and may be addressed at Wolf & Co., Thirty-first street and Fourth avenue, New York. He desires to receive communications relating to business between this country and Germany.

Paul L. Tyson, chemist of the Carpenter Steel Company, Reading, Pa., lectured to the students of the Keystone Correspondence School of Reading, on March 10, on "The Manufacture of Iron and Steel."

Thomas Murray has resigned from the directorate of the United States Steel Corporation. The number of directors has been reduced from 24 to 18. Mr. Murray's resignation brings about the complete reduction, there having been five vacancies. It is expected to reduce the finance committee from nine to seven members at the annual meeting of stockholders, to be held April 19.

Daniel Davenport, who has had charge of the legal interests of the American Anti-Boycott Association from the beginning, received a testimonial from the membership at the recent annual dinner in New York. The gift was $10,000 in bonds of the city of New York. Ex-Congressman Charles E. Littlefield in making the presentation paid tribute to the service Judge Davenport had rendered the manufacturers of the country, the efforts of years culminating in the Supreme Court judgment against the members of the hatters' union in the famous Danbury case.

J. Potter, secretary of H. W. Ward & Co., Ltd., a prominent machine-tool maker of Birmingham, England, spent several days last week visiting plants in Cincinnati, Ohio.

Albert C. Rea, Jefferson, Wis., for eleven years erecting engineer for the Allis-Chalmers Mfg. Company, Milwaukee, Wis., has resigned to engage in the garage and machine-shop business at Libertyville, Ill.

F. E. Bausch, manager at St. Louis for the Hooven, Owens, Rentschler Company, has been appointed a member of the committee on meetings in St. Louis for the American Society of Mechanical Engineers.

G. Burki, formerly with the E. L. Essley Machinery Company, Chicago, has acquired a financial interest in the Badger-Packard Machinery Company, Milwaukee, Wis., which deals in machinery, machinists' and mill supplies and transmission equipment. He is the vice-president of the company and will have charge of the machinery end of the business. Mr. Burki served his time as an apprentice and has been superintendent of various establishments.

C. B. Peck has resigned the position held by him for a number of years in the New York office of the B. F. Sturtevant Company, and after May 1 will be associated with Blake & Williams, steam heating contractors, 26 Grove street, New York City.

E. L. Leeds, who has been since 1907 manager of the railroad equipment department of the Niles-Bement-Pond Company, New York, has been appointed general manager of sales of that company and of the Pratt & Whitney Company, Hartford, Conn. C. K. Seymour has been appointed assistant to Mr. Leeds. The latter succeeds W. L. Clark, who resigned a few weeks ago, and who was in charge of sales for the Niles-Bement-Pond Company. Mr. Leeds also succeeds B. M. W. Hansen, vice-president of the Pratt & Whitney Company, as manager of sales of that company. Mr. Seymour was formerly connected with the Niles-Bement-Pond Company, but left it for a time to look after other business and has now returned.

N. C. Clausen, for over 12 years chief engineer with the James McKinney & Sons Iron Works, Albany, N. Y., has resigned to become president of the N. C. Clausen Architectural Iron Company, Tivoli street, Albany, N. Y., recently incorporated.

A. C. Cook, sales manager of the Warner & Swasey Company, Cleveland, Ohio, returned from abroad March 15.

Carlton R. Mabley, for the past five years general manager of the R. I. V. Ball Bearing Company, has joined the selling organization of the S. K. F. Ball Bearing Company, 50 Church street, New York, the growth of whose business since its introduction into this country from Sweden in 1910 has necessitated many additions to its forces.

T. A. Rickard, editor of the Mining Magazine, London, England, is to become editor of the Mining Press, San Francisco. H. Foster Bain, present managing editor of the Mining Press, will occupy the editorial chair of the London Mining Magazine.

William A. Schendel has been appointed purchasing agent for the A. J. Lindemann & Hoverson Company, stove manufacturer, Milwaukee, Wis. He was formerly associated with the A. O. Smith Company, Milwaukee.

F. A. Carlisle has become associated with L. V. Estes, Inc., efficiency engineer, McCormick Building, 332 South Michigan avenue, Chicago. He was formerly associated with the efficiency engineering staff of the Western Electric Company.

Boyd B. Jack, assistant superintendent in the sheet department of the Inland Steel Company, Indiana Harbor, Ind., has been given charge of the new sheet mills of the Empire Rolling Mill Company, Cleveland, Ohio.

Joseph R. Jackson, formerly assistant superintendent in the finishing department of one of the structural mills at the South works of the Illinois Steel Company, has been placed in charge of the new structural mill of the Pennsylvania Steel Company, Steelton, Pa.

F. T. Snyder, president Snyder Electric Furnace Company, Chicago, Ill., returned this week from a trip to England.

Orion J. Willis, for six years assistant manager of sales of the American Sheet & Tin Plate Company at St. Louis, has been appointed manager of sales, succeeding William J. Wetstein, deceased.

The stockholders of the Lackawanna Steel Company have re-elected directors with the exception of James Speyer, who declined to accept re-election and whose place was filled by the choice of Beekman Winthrop.

Blast Furnace Notes

One blast furnace of the Alan Wood Iron & Steel Company at Swedeland, Pa., went into blast March 9. Prior thereto both furnaces of the company had been idle for some time. The furnace just started was inclined to behave badly at first, but soon corrected itself and less "off" iron than usual was made.

The furnace of the Struthers Furnace Company, Struthers, Ohio, which has been undergoing repairs and partial relining, following a slip several weeks ago, was blown in March 14.

The furnace of Joseph E. Thropp, at Everett, Pa., was blown in March 6.

No. 1 blast furnace of the Youngstown Sheet & Tube Company, Youngstown, Ohio, was started on Sunday, March 14. All four stacks are now in operation for the first time in some months, turning out about 2000 tons of pig iron per day.

FEDERAL TRADE COMMISSION

To Continue Work of Bureau of Corporations and to Consider Export Combinations

WASHINGTON, D. C., March 16, 1915.—The Federal Trade Commission was formally organized today when its five members were sworn in by Chief Justice Covington of the District Supreme Court, who, while a member of Congress, drafted the bill by which the commission was created. All the commissioners—Joseph E. Davies, of Wisconsin; Edward N. Hurley, of Illinois; William J. Harris, of Georgia; William H. Parry, of Washington, and George Rublee, of New Hampshire—were present at the first formal session, at which Commissioner Davies was elected as chairman. The selection of a secretary was deferred until later. Dr. Francis H. Walker, who has served for several years as deputy commissioner of corporations, will be appointed chief examiner, a post paying $5000, which is also the salary the secretary will receive. For the present the commission will occupy rather cramped quarters in the building of the Department of Commerce, Congress having refused a rental appropriation of $10,000.

As a basis for the work of the commission, the Bureau of Corporations has collected a vast amount of data, which has been filed and elaborately indexed. According to Commissioner Davies, about 90 per cent. of the industries of the country have been examined in a general way, so as to have material at hand for a brief general survey and a somewhat more comprehensive review of about 20 leading industries has also been made, designed to supply information as to the general facts of the processes of manufacture, organization and dominating financial control in the various industries. A card index of directors of the principal industrial, railroad and public-utility corporations, insurance companies and banks has also been made for the same purpose. There are approximately 6500 corporations, exclusive of steam railroads, banking and other financial corporations, and public service corporations under the jurisdiction of the Interstate Commerce Commission, that have a capital stock or bonded and other indebtedness amounting to $1,000,000 or over engaged in interstate commerce. Approximately one-third of these have voluntarily furnished, upon request, reports as to their financial condition, organization and other facts.

The expert and clerical force of the old Bureau of Corporations will complete a number of reports on investigations heretofore undertaken relating to farm-machinery associations, the tobacco industry, the taxation of corporations and the conflict of corporation laws among the states. The new organization of the commission will take an active part in completing a comprehensive study, begun sometime ago by the Bureau of Corporations, concerning the relative efficiency of so-called trusts and smaller independent corporations. This inquiry was begun at Secretary Redfield's direction, to determine, not only from the standpoint of business profits but also from that of social welfare, whether the trust form of organization "is really economically and socially efficient." Secretary Redfield's personal opinion is that the trusts are less efficiently managed than some of the highly organized independent corporations.

The advisability of permitting combinations in export trade, a subject that has been much discussed of late and has attracted President Wilson's personal attention, will be among the first of the problems to be considered by the commission and the advocates of such combinations hope that the commission will make a comprehensive report on the subject to Congress at its next session.

The only investigation which the commission has before it under the direction of Congress, is that ordered at the last session on a resolution by Senator Gore, of Oklahoma, to determine certain facts with regard to the Standard Oil Company, including the relation now existing among the several companies into which it was dissolved in pursuance of the decision of the United States Supreme Court. W. L. C.

OBITUARY

CHARLES A. SCHIEREN, former mayor of Brooklyn, N. Y., and founder of the Charles A. Schieren Company, belting manufacturer, died March 10 at his home in that city from pneumonia, aged 73 years, and on the following day his widow died from the same cause. Mr. Schieren was born in Dusseldorf, Germany, and came to this country with his parents in 1856. In 1868 he embarked in the leather business in New York City and from a humble beginning his house eventually became one of the largest in the trade in the United States. His son, Charles A. Schieren, Jr., is president of the Charles A. Schieren Company. He leaves two other sons and a daughter. He had large financial interests, was officially connected with several banks and trust companies and was a member of numerous clubs. He took a deep interest in the welfare of the Lutheran church and gave generous financial aid to its activities.

JAMES R. DARRAGH, for many years resident manager of Rogers, Brown & Co., at Pittsburgh, died suddenly of heart disease in Canton, Ohio, March 15, where he had gone on a business trip. For nearly 35 years he was connected with the Isabella Furnace Company, and later with the American Steel Hoop Company, prior to the time these two concerns were taken over by the Carnegie Steel Company. He leaves his widow, a daughter and two sons.

J. F. ATCHESON, for many years identified with coal and coke interests in western Pennsylvania, died suddenly from apoplexy in his office at Pittsburgh March 8. For a number of years he was secretary of the Coal Association, and later was interested with H. C. Frick in the development and sale of several coal tracts. He was 61 years of age.

CHARLES F. MAYNARD, founder of the Maynard Steel Foundry Company, Milwaukee, Wis., died from heart trouble March 6, aged 65 years. He was a native of Worcester, Mass., and in 1866 became associated with the Filer & Stowell Mfg. Company, Milwaukee. In 1889 he established a steel foundry, retiring from active business in 1913.

WALTER A. ANGER, president and general manager of the Anger Engineering Company, Milwaukee, Wis., automobiles and trucks, died March 8 from pneumonia, aged 36 years. After serving as designer and engineer for several large automobile and parts concerns in Milwaukee, Mr. Anger established a factory of his own in 1909.

ALBERT BALDWIN, JR., president of the old-established wholesale hardware house of A. Baldwin & Co., New Orleans, La., died March 11, aged 49 years. He had large interests in other important commercial enterprises and was also officially connected with prominent local financial institutions.

HENRY H. SESSIONS, vice-president of the Standard Coupler Company, died March 14, at his Chicago home. He was born at Madrid, N. Y., in 1847. He is known as the inventor of a number of railroad equipment appliances and was manager of the Pullman car works from 1885 to 1892.

FRANCIS H. NAYLOR, for many years proprietor of the Naylor Iron Works, Front street and Girard avenue, Philadelphia, died March 7 at his home in that city, aged 59 years. Ill health caused his retirement several years ago. He leaves his widow and two sons.

CHARLES D. COBAU, president of the Standard Engineering Company of Ellwood City, Pa., died at Phoenix, Ariz., last week, aged 43 years. He had gone there for the benefit of his health. He leaves his widow and three children.

The annual meeting of the Weir Frog Company, Cincinnati, Ohio, was held March 4. The following board of directors was elected: O. DeGray Vanderbilt, H. W. McCandless, N. O. Goldsmith, Charles F. Barrett and J. L. Laikner.

Pittsburgh and Nearby Districts

The Youngstown Iron & Steel Company, Youngstown, Ohio, which will build an open-hearth steel plant near the blast furnace of the Ohio Iron & Steel Company at Lowellville, Ohio, has awarded a contract to the William Tod Company, Youngstown, for a 30-in., three-high combination blooming and sheet-bar mill, to be equipped with three planishing strands; also one 36-in., three-high slabbing and universal plate mill with all accessories, including tables, shears, transfers and ingot carriers. The capacity of the new plant will be 600 to 800 tons of sheet bars per day, the larger part of which will be used by the company in its sheet mills at Youngstown, and the remainder sold in the open market. Hot metal will be used in the three 80-ton open-hearth furnaces, which will be delivered from Mary furnace over about one-half mile of railroad track. All equipment will be motor driven. Contracts for the electrical machinery are expected to be placed in a few days. The steel buildings to contain the plant are now well underway. It is expected to have the open-hearth department ready for operation within six to eight months.

Charles E. Willock, Pittsburgh, recently asked an option on the control of the LaBelle Iron Works, Steubenville, Ohio, on the basis of $140 for the preferred stock and $60 for the common, but the officers of the company refused to give the option.

Mattie blast furnace of the Girard Iron Company, Girard, Ohio, which has been idle for some months, is being prepared for blast and will likely blow in about April 1. The company is now operating all of its 88 puddling furnaces at Girard, and this has made necessary the starting up of the blast furnace, which will likely run on forge iron.

At Pittsburgh last week hearings were held by George M. Brown, representing the Interstate Commerce Commission, on the request of the railroads for an increase in the rates now charged for trapping cars. The proposed changes are 2c. per 100 lb., with a minimum of $2 per car, at points east of Pittsburgh, and 4c. per 100 lb., with a minimum of $4 a car at points west of Pittsburgh. It is contemplated that "trap" or "ferry" cars shall be loaded to a weight of not less than 10,000 lb. and in the event they are not loaded to this weight, the following additional charges will apply: 9000 to 9999 lb., add $1 a car; 8000 to 8999 lb., add $2; 7000 to 7999 lb., add $3; 6000 to 6999 lb., add $4; 5000 to 5999 lb., add $5; less than 5000 lb., add $6. When loaded to the cubic capacity of the car, freight of a light and bulky character will not be subject to the additional charges imposed when the weight is less than 10,000 lb. The proposals of the railroads to make these charges is being strongly opposed.

The Carnegie Steel Company has completed and put in operation what is known as the No. 6 continuous bar mill at its Duquesne steel works, Duquesne, Pa. The mill and cooling bed were designed largely by Homer D. Williams, general superintendent of the Duquesne works. The mill, which is electrically driven, consists of several continuous stands connected by repeaters. A revolving shear is provided at the entrance to one of the stands. The shear blades, when released, are pulled into the billet by the motion of the latter. The cooling bed contains many interesting features intended to prevent the slightest buckling of the bars during cooling. All the important innovations on the mill have been protected by patents.

The plant of the American Car & Foundry Company at Huntington, W. Va., which has been idle for some time, started in partial operation on Monday, March 15. It has received an order from the Baltimore & Ohio railroad for 200 50-ton steel hopper car bodies.

Last week the bi-monthly settlement of the bar-iron scales in the Central West was made, and showed the average price on base sizes of iron bars shipped out in January and February was slightly above 1c. The puddling rate for March and April will remain at $5.50 per ton, the same as in January and February.

The Pittsburgh Steel Tie Company, Pittsburgh, has been granted a Delaware charter with a capital of $150,000 to manufacture steel ties for railroads.

At the annual meeting of stockholders of the Union Switch & Signal Company, held in Pittsburgh last week, directors were elected as follows: J. D. Callery, J. J. Donnell, William McConway, J. R. McCune, J. R. McGinley, M. F. Rosenwald, T. W. Siemon, W. D. Uptegraff and H. H. Westinghouse. Mr. Callery takes the place of J. R. Miller and Mr. McGinley the place of Thomas Rodd.

The Williamson Light & Ice Company, Williamson, W. Va., will purchase a 400 kw. generator and other power machinery.

John Stevenson, Jr., president Driggs-Seabury Ordnance Corporation, Sharon, Pa., says that his company has turned down orders in the past four or five months for very large amounts of war materials. He says: "The last time we made shells was eight years ago. It is far better to make things that are useful for mankind than it is to make things that destroy mankind."

It is the intention of the Youngstown Sheet & Tube Company, Youngstown, Ohio, to move its present puddling mill to make room for more sheet and jobbing mills. It is probable the puddling mill will be located near the by-product coke ovens, soon to be built, and the puddling furnaces will then be fired with waste gas from the ovens. Some time ago natural gas was tested in a double puddling furnace of the company and worked very satisfactorily, but the price of gas was too high to use it regularly.

After considering the matter for some time, the Republic Iron & Steel Company, has decided to go ahead with the building of a benzol plant at Youngstown, Ohio. The contract has been awarded to the Otto Coking Company, Inc., New York, and the plant is expected to be in full operation in four to five months.

The report that the LaBelle Iron Works, Steubenville, Ohio, will spend about $3,000,000 in betterments and additions is exaggerated. The company has under consideration the building of 70 by-product coke ovens to make about 900 tons of coke per day, or enough coke to operate its two blast furnaces. The type of oven has not yet been decided upon but will be shortly, when the work of erection will be started. At present the company is operating to a little over 50 per cent, one of its two blast furnaces being in blast, five of 11 open-hearth furnaces are running, seven of eight sheet mills, two jobbing mills, one of the two plate mills, and one of the two furnaces in the pipe mills.

The Page Woven Wire Fence Company, Monessen, Pa., recently installed 230 hp. motors and its wire-drawing blocks are now being operated with electric power furnished by the West Penn Traction Company from its central plant at Connellsville, Pa. It is the intention of the Page Company to install additional equipment to drive all its machinery electrically.

At the annual meeting of stockholders of the La Belle Iron Works, held in Wheeling, W. Va., on Tuesday, March 9, Edward Hazlett, A. S. List and D. J. Sinclair retired as directors, and James Morgan Clarke and Frank M. Work of Steubenville, and Howard Hazlett of Wheeling, were elected in their stead. The annual report of the company was submitted and showed that its net earnings were equal to about 3¾ per cent. on the preferred stock. It is stated that the proposed merger of the La Belle Iron Works and the Wheeling Steel & Iron Company is off completely, having been decided a violation of the Clayton anti-trust law.

Bids were opened at Washington, D. C., March 12, for the construction of a new testing station at Pittsburgh for the United States Bureau of Mines. The building will require about 500 tons of steel. The contract for the machinery, including boilers, pumps and ventilating system, will be placed in the near future. The George B. Willis Company, New York City, is low bidder at $257,922 for the construction of the building.

It is stated that the Westinghouse Electric & Mfg. Company, East Pittsburgh, has recently placed orders for 40 additional lathes for use in making shrapnel.

The Weirton Plate & Structural Company, Weirton, W. Va., has filed an involuntary petition in bankruptcy.

To Build Up Our Merchant Marine

American manufacturers and others interested in export business have been invited in the last few days to join in a movement looking to create a public demand for enactment by Congress of "permanent legislation that will restore the American flag to a commanding place in the world's shipping." The plan is to form the National Marine League with 500 founder members. Each such founder member is asked to contribute at least $250, which incidentally will cover life membership. The league will be managed by a board of trustees selected from the founder members and branches are to be established in the 12 federal banking districts. At least 150 members is considered New York City's representation. Emphasis is placed in the invitation to the desirability of releasing the handicap on the commerce of the country through the lack of an American merchant marine.

Collections are to be made through J. P. Morgan & Co. Those issuing the invitation are: William P. Clyde, Clyde Line; Col. Robert M. Thompson, president New York Metal Exchange; August Belmont; Edmund L. Baylies, Carter, Ledyard & Milburn, lawyers, New York; A. A. Raven, president Atlantic Mutual Insurance Company, New York; Frederick H. Allen, Allen & Cammann, lawyers, New York, and P. H. W. Ross, president National Marine League.

Worcester Metal Trades Association

The Worcester Branch, National Metal Trades Association, held its annual meeting March 10. The officers elected were: President, John W. Higgins, Worcester Pressed Steel Company, Worcester, Mass.; vice-president, Charles Fosdick, Fitchburg Steam Engine Company, Fitchburg, Mass.; treasurer, Arthur W. Beaman, Stockbridge Machine Company, Worcester. Executive board—Leon Young, Dupaul-Young Optical Company, Southbridge, Mass.; J. H. Drury, Union Twist Drill Company, Athol, Mass.; Herbert L. Flather, Flather & Co., Nashua, N. H.; W. H. Gates, Baldwin Chain & Mfg. Company, Worcester; Gifford Simonds, Simonds Mfg. Company, Fitchburg, and Jerome R. George, Morgan Construction Company, Worcester. The principal after-dinner speaker was Herbert H. Rice, Indianapolis, president National Metal Trades Association.

The American Multigraph Company, Cleveland, Ohio, is planning to do various kinds of machine-shop work, including possibly the making of war material. The company's present charter does not permit it to engage in machine-shop work, and a meeting of the stockholders has been called for April 8 at which a change in the charter will probably be authorized.

Reference is made by the Birmingham, Ala., press to a recent record of the Woodward Iron Company, the three furnaces at Woodward, Ala., making 1169 tons of pig iron in 24 hr. In January the output was 32,002 tons, or an average of 1032 tons a day. In February the average of the three furnaces was increased to 1061 tons a day.

The Terry Steam Turbine Company, Hartford, Conn., announces that after March 22 its Chicago office will be in charge of A. W. de Revere, Peoples Gas Building. An office has also been opened in the Michigan Trust Building, Grand Rapids, Mich., in charge of A. L. Searles, to cover the southern peninsula of Michigan.

The Boston Bolt & Iron Company, Boston, Mass., has filed a voluntary bankruptcy petition in the United States District Court showing $55,552 liabilities and $49,183 assets. All claims are unsecured.

The Modern Structural Steel Company, Waukesha, Wis., has filed a petition to change its corporate name to the Federal Bridge Company, its former name having proved unsatisfactory.

Cold-Finished Steel and Shafting Extras

Makers of cold-rolled shafting and cold-finished steel have adopted a new standard price list and a new standard classification of extras, effective March 15. Heretofore, these products have been sold with freight allowed to different zones, but in the future all sales will be made f.o.b. Pittsburgh, with actual freight rate to destination added. The new price list and extras are as follows:

Standard Price List

Rounds				Squares and Hexagons	
Inches	Per lb.	Inches	Per lb.	Inches	Per lb.
½ to 5/16	$0.09½	3 1/16 to 3 1/8	$0.05½	½ to 5/8	$0.14
5/16 to 11/32	.07½	3⅛ to 3 15/16	.05½	11/16 to ¾	.12
11/32 to ½	.06½	4 to 4 1/16	.06	⅞ to 15/16	.10
9/16 to ⅝	.06	4⅛ to 4 15/16	.06½	1 to 1 1/16	.09
⅝ to 11/16	.05½	5 to 5 1/16	.07	1⅛ to 1⅜	.08½
¾ to 1 1/16	.05½	5⅛ to 5 15/16	.07½	1⅜ to 1¾	.07½
1⅛ to 1 15/16	.05½	6 to 6 1/16	.08½	1¾ to 2	.07
2 to 3	.05	6⅛ to 7	.09	2 1/16 to 2 7/16	.08
				2½ to 3	.08½
				3 1/16 to 4	.09

Flats
(Prices given are in cents per lb.)

Thickness in Inches	⅛ to ½	⅝ to 1¼	½ to 1	1 1/16 to 1½	1 5/16 to 3	Wider than 3
½ and 5/8	18	18	14	12	10	10
11/16 to ¾	16	16	12	10	8	10
⅞ to 15/16	14	14	10	10	8	10
1 to 1 1/16	...	10	8	8	8	10
1⅛ to 1¼	...	10	8	8	8	10
1⅜ to 1½	...	...	8	8	8	10
1 to 1 1/16	...	...	...	8	8	10
1½ to 1¾	...	...	...	...	8	10
1⅞ to 1 15/16	...	...	...	...	8	10
2 to 2 1/16	...	...	...	...	8	10

Standard Classification of Extras

Shafting—Extras on Rounds, Sizes Smaller than ½ in.
List prices on sizes smaller than ½ in. apply on screw stock quality in random mill lengths. Shafting quality and any grade other than screw stock, or screw stock cut to accurate lengths with lathe or saw cut ends—15c per 100 pounds net.

Extras for Chamfering (for automatic screw machine use only.)

	Rounds Per 100 Lb. Net	Hexagons and Squares Per 100 Lb. Net
7/16 to ½	$0.13	$0.15
9/16 to 15/16	.10	.13
1 to 2	.065	.115
2 1/16 and larger	.04	.10

These extras apply on lengths 10 ft. and longer and one end bar only. For sizes smaller than 7/16 in. and shorter than 10 ft., special prices will be quoted.

Boxing and Burlapping.
Boxing (minimum 50c) ... $0.20 per 100 lb.
Burlapping (minimum 25c), full length ... .15 " 100 "
Burlapping of ends only ... .05 " 100 "

Piston Rod Steel.
Uniformity to size and carefully selected surface finish, 50c per 100 lb. net.

Extras for Accuracy.
For accuracy from exact size to .0015 in. under ... $0.25 per 100 lb. net.
For accuracy from exact size to .001 in. under ... .50 " 100 " "
For accuracy within .0005 in. either way of a specified size or from exact size to .001 in. over ... 1.00 " 100 " "

Quantity Differentials
All specifications for less than 1000 lb. of a size will be subject to the following extras, the total weight of a size ordered to determine the extra, regardless of length and regardless of the exact quantity actually shipped:
500 to 999 lb ... $0.05 per 100 lb. net.
100 to 499 lb ... .10 " 100 " "
Less than 100 lb ... .20 " 100 " "

Extras for Long and Short Lengths.

Inches	Rounds Per 100 Lb. Net	Squares Per 100 Lb. Net
3 to 5½	$1.00	$1.00
6 to 11½	.50	.50
12 to 23½	.25	.50
24 to 59½	.10	.25

	Hexagons Per 100 Lb. Net	Flats Per 100 Lb. Net
3 to 5½	$1.00	$2.00
6 to 11½	.50	1.00
12 to 23½	.25	.50
24 to 59½	.10	.25

Lengths longer than 24 ft. and less than 30 ft. ... $0.50 per 100 lb. net.
30 ft. and less than 35 ft ... 1.00 " 100 " "
35 ft. and less than 40 ft ... 1.50 " 100 " "
40 ft. and less than 45 ft ... 2.00 " 100 " "
45 ft. and longer ... 2.50 " 100 " "
Extras for long lengths apply on rounds, squares, hexagons and flats.

Freight Allowances and Delivery.
The discount or price quoted is base, Pittsburgh. If shipment is made from a point other than Pittsburgh (or Pittsburgh district) the freight from Pittsburgh to destination will be added, and the freight from shipping point to destination deducted.

Launching of the dreadnaught Pennsylvania took place March 16 at the plant of the Newport News Ship Building & Dry Dock Company, Newport News, Va. It is the largest vessel ever launched at that yard, the hull alone having a displacement of about 15,000 tons.

Peter K. Morrison has been appointed receiver for the B. T. K. Gear & Engine Company, Muncie, Ind., which manufactures auto parts and does a metal-plating business. The plant is to continue in operation.

Important New Work of Steel Corporation

The United States Steel Corporation has considerable new work under way at various plants of its subsidiaries. At the meeting of the directors on Tuesday, March 16, an appropriation of $500,000 was authorized for the erection of a steel tie plant in connection with the Homestead steel works. Work will begin at once. The Carnegie Steel Company has been manufacturing steel ties for a number of years, but its operations have not been on a scale permitting of the economies which will be possible when the new plant is finished. The ties are rolled on the structural mill and fabricated in the shops. The demand for these ties is rapidly growing, the output having been 40,000 to 50,000 tons per annum. The Bessemer & Lake Erie Railroad now has 300 miles of track laid with steel ties.

At the New Castle works of the Carnegie Steel Company a new mixer is to be built and extensive improvements made to the blast furnaces. Additions and new equipment are also contemplated at the steel works and rolling mills. The appropriation for the New Castle work amounts to $300,000.

Work is in progress at South Sharon, Pa., and at Gary, Ind., on benzol recovery plants. Mention has previously been made of the former, the contract having been let in 1914. It will be in operation about July 1 and will have a capacity of 800,000 gallons of benzol per year under working conditions. The Gary benzol recovery plant connected with the Koppers by-product coke ovens there will be very extensive. The appropriation amounts to $800,000. The capacity will be 4,500,000 gallons of benzol per year and it is expected the plant will be in operation by the end of the year. The two benzol plants were projected before the European war.

Another Increase in Steel Corporation Orders

The regular statement of the United States Steel Corporation of unfilled orders on its books February 28, 1915, shows a total of 4,345,374 tons, as compared with 4,248,571 tons on January 31, 1915. This is a gain of 96,803 tons, about half what was expected. On February 28, 1913, the unfilled tonnage was 7,656,714 tons. The following is a statement of unfilled tonnage for each month, beginning with the high point of December 31, 1912:

February 28, 1915	4,345,374	December 31, 1913	4,282,108
January 31, 1915	4,248,571	November 30, 1913	4,396,347
December 31, 1914	3,836,643	October 31, 1913	4,513,767
November 30, 1914	3,324,592	September 30, 1913	5,003,785
October 31, 1914	3,461,097	August 31, 1913	5,223,468
September 30, 1914	3,787,667	July 31, 1913	5,399,356
August 31, 1914	4,213,331	June 30, 1913	5,807,317
July 31, 1914	4,158,589	May 31, 1913	6,324,322
June 30, 1914	4,032,857	April 30, 1913	6,978,762
May 31, 1914	3,998,160	March 31, 1913	7,468,956
April 30, 1914	4,277,068	February 28, 1913	7,656,714
March 31, 1914	4,653,825	January 31, 1913	7,827,368
February 28, 1914	5,026,440	December 31, 1912	7,932,164
January 31, 1914	4,613,680		

Another Western Sheet Mill Reduces Wages

PITTSBURGH, PA., March 17, 1915.—(*By Telegraph.*)—The Youngstown Iron & Steel Company, Youngstown, Ohio, has posted notices at its sheet mills that from Monday, March 22, the scale of wages in effect will be the same as that agreed upon in Pittsburgh March 5, which calls for an average reduction of 11 2/10 per cent. The men employed in the sheet mills of this company voted in favor of accepting the reduction, and it is believed they will continue at work. Nearly all the employees in the sheet and tin-plate mills of the Trumbull Steel Company have returned to work at the reduction of 11 2/10 per cent. in the sheet scale and about 13 per cent. in the tin-mill scale.

Henry E. Dreier has been appointed receiver for the Shimer Wire & Steel Company, Evansville, Ind. The plant is being continued in operation.

CASH REGISTER CASE REVERSED

Circuit Court Throws New Light on Monopoly and Unfair Competition

In the case of John H. Patterson, president, and 27 others connected with the National Cash Register Company, of Dayton, Ohio, convicted of violating the Sherman anti-trust law, the United States Circuit Court of Appeals at Cincinnati has just reversed the judgment of the District Court in the Government's case and remanded the case for a new trial. Mr. Patterson had been sentenced to one year's imprisonment and to pay a fine of $5,000, while the others got terms of from nine to twelve months. The New York Times says of the decision:

"Each fresh decision does something to make the law clearer. Now we have the declaration that there can be no such thing as a reasonable conspiracy. That is likely to be a companion to the discovery that there may be a reasonable restraint of trade, or rather that if the restraint of trade is reasonable it is not within the law. Hereafter, if a conspiracy is shown, it cannot be defended on the ground that it is reasonable, but it may be defended unless it is shown affirmatively that it exists at any given time. In this case it was not proved that the conspiracy existed at the time of the indictment. At the time of the unfair competition it existed on both sides, the court explicitly saying that the defendants' business had been 'pirated' as well as that it had competed in the same manner.

"There was little to choose between the trade morality of the defendants and of those whom it had driven out of existence. The difference between them was that the defendants had the advantage of basic patents, because they were the pioneers in the industry, and because of the 'very great capacity' in the management of its affairs. The defendants prospered for these reasons 'without reference to any unfair treatment of their competitors.'

"The two other counts were of actual monopoly in the trade rather than of unfair methods of establishing the monopoly. The court said: 'Doing business, no matter how large, is not monopoly.' There are larger businesses than the Cash Register Company, but there are few, if any, doing a larger proportion of the trade concerned. If these defendants are not monopolists, either in fact or in method, there are few who need worry about going to jail for monopoly. The trouble is that the law has too many teeth to be enforced literally. That is the trouble with all statutes altering the course of trade by edict. Trade cannot be altered in that way without a revolution, and revolutions are not made by statute. When economic revolution alters trade, then statutes may embody the results of the revolution. But the common law, the people's customs, rule, not the lawmakers. The decisions under the Sherman anti-trust law are more popular than the law itself, for the simple reason that the literal application of the statute would have ruined the country as surely as the policy of the Interstate Commerce Commission was ruining the railroads."

Recently the Civic and Commerce Association, Eau Claire, Wis., held its annual manufacturers' week, at which the manufacturers of the city displayed their products. Among those participating was the McDonough Mfg. Company, manufacturer of woodworking machinery. The prize this year, for excellence of manufacturing, was a loving cup and was awarded to this company, which has been running its plant night and day for the last four months, and in addition, subletting work to other shops.

The Keasey Mfg. Company, which will move its plant from Toledo to Fostoria, Ohio, has purchased in the latter city the building occupied by the Vega Cream Separator Company. The company has effected its re-organization by the election of the following officers: President, T. T. Rosendale; vice-president, B. M. Solomon; secretary, E. D. Sullivan; treasurer, E. B. Keasey.

American Radiator Company's Year

The sixteenth annual report of the American Radiator Company, for the fiscal year ended January 31, shows a further increase over the previous year's high mark in the company's business. Net profits were $2,289,075.40, compared with $2,081,267.29 in the year 1913-14. The aggregate net profits of the company's foreign subsidiaries were $495,665.83, against $884,248 the year before. The aggregate surpluses of the foreign companies at the close of the year were $6,396,451.48, which is in excess of that for the fiscal year 1913-14. No dividends have yet been paid by these foreign companies since their inception, their entire profits having been utilized to continue the extension of business abroad. The surplus of the parent company at the close of the year was $7,127,585.76, and the combined surplus of the parent and the foreign companies was $13,524,037.24.

The comparative income account of the company for the past two years is as follows:

	1914-15	1913-14
Net profits	$2,289,075.40	$2,081,267.29
Less dividends:		
Preferred stock	210,000.00	210,000.00
Common stock	*1,655,680.00	†1,393,590.00
Total dividends	$1,865,680.00	$1,603,590.00
Surplus for year	$423,395.40	$477,677.29

*Cash, $911,580, and stock, $744,100.
†Cash, $717,090, and stock, $676,500.

Following are extracts from the remarks of President Clarence M. Woolley, which accompany the report:

"The last fiscal year was signalized by substantial advancement, not alone in the improvement of manufacturing facilities but in realizing a higher degree of cooperative efficiency in their utilization by the individual workers. The financial condition of the company is satisfactory. The quick assets, as disclosed by the balance sheet, represent an amount equal to 59 per cent. of the capital stock outstanding.

"The business in foreign countries had disclosed a generous increase up to August 1, but thereafter, due to the European war, the volume of business and net profits have materially decreased. Each of the foreign companies, however, continues to transact some business, and the aggregate profits as of January 31, 1915, were in excess of the earnings as of August 1, 1914, showing that progress has been made notwithstanding the conditions created by the war."

Pittsburgh Foundrymen's Association

The regular monthly meeting of the Pittsburgh Foundrymen's Association was held in the Fort Pitt Hotel, Pittsburgh, on the evening of March 15. In the afternoon 30 to 40 members made a trip of inspection to the recently dedicated Mellon Institute of Industrial Research at the University of Pittsburgh. The party was much interested in the laboratory facilities, where about 30 chemists are at present employed, and also the recently installed machine shop. At the evening meeting Dr. Sholes of the Mellon Institute made an address with lantern slides, in which he outlined the different ways that the Institute could be of benefit to the foundrymen in the Pittsburgh district. It is believed that many of them will avail themselves of the benefits to accrue from the use of its facilities.

Merchandise exports from the port of New York for the week ended March 13 amounted to $40,896,630—a total, according to Custom House authorities, never before reached. For the country the estimated total was $47,000,000.

The Great Lakes Engineering Works, Detroit, has closed a contract for three boats to go to the Atlantic coast. One will be a 256-ft. steamer for the American Coast Line. The other orders are for large dump scows.

The total of foreign-built vessels admitted to American registry up to and including February 27 is 133 of 475,524 gross tonnage.

Employees' Grievance Committee

The Taylor System and the New Watertown Arsenal Plan

WASHINGTON, D. C., March 16, 1915.—Interesting developments have occurred at the Watertown arsenal in the labor situation as affected by the recent order of the War Department giving the employees the right to participate in negotiations for the settlement of grievances that may arise among workmen in the several departments. The system authorized by General Crozier was based upon a project devised by the United States Commission on Industrial Relations, but it differed in some particulars. The commission in an announcement to the press, which appears to have been prematurely made, gave the impression that the War Department's order practically incorporated the commission's plan and that the workmen at Watertown had accepted it. Soon after this, however, N. P. Alifas, the representative of the Watertown employees, affiliated with the International Association of Machinists, announced to the press that the employees at Watertown had rejected the plan embraced in General Crozier's order and the public, therefore, has been led to believe that nothing has been accomplished by the negotiations.

The officers in charge of the arsenals and their superiors in the War Department carry a responsibility which differs entirely from that borne by the management of an ordinary commercial plant. They are not only governed by a multitude of statutes, but under the terms of their commissions as army officers they are required to see that the interests of the Government are at all times protected, regardless of the consequences to private individuals. General Crozier's order provided a method under which the employees might settle their grievances, if they elected to do so; otherwise, the general regulations heretofore in force at the arsenal would be invoked in all cases. By the provision of joint shop boards, plant boards, mediation boards and supreme mediation boards with final appeals to the Chief of Ordnance and the Secretary of War, the employees were allowed a greater participation than they have heretofore enjoyed and it might have been supposed they would have welcomed the innovation. It appears, however, that the men did not finally reject General Crozier's order, but that they are seeking to amend it. The organization of the workmen at Watertown includes a sort of council made up of one representative of each department and this council is seeking the changes. Negotiations are still in progress and Mr. Alifas is authority for the statement that the leaders of the men hope to reach an agreement under which the chief features of the project will be adopted.

An important modification desired by the workmen was the acceptance by the Chief of Ordnance and the Secretary of War of decisions of the supreme mediation board as final. General Crozier has been unable to see his way to adopting this view, as such an arrangement might in time force him to accept a decision contrary to the best interests of the Government, which he is bound by oath to protect under all circumstances.

The question of the continued use of the Taylor time-study and premium system at Watertown is not involved in the above negotiations. In promulgating the order relating to grievances, General Crozier specifically stated that "the employees are understood as not waiving any objections which they may have to any method or manner of work which may be in force in the said arsenal, such for instance as the stop-watch elemental time studies or the premium system for payment to employees." While the officials are disposed to show the employees every consideration, it is unlikely that any important features of the Taylor method will be abandoned.

W. L. C.

The Hydraulic Pressed Steel Company, Cleveland, Ohio, has received an initial order for pressed steel concrete forms for use in building a 12-ft. sewer tunnel in Chicago and expects to furnish all the forms needed for this tunnel.

Machinery Exhibitors at the Panama-Pacific International Exposition

Among the exhibitors in Machinery Palace of the Panama-Pacific International Exposition are the following:

Acme Machinery Company, Cleveland, bolt and rivet making machinery.

T. R. Almond Mfg. Company, Ashburnham, Mass., drill chucks.

American Tool Works Company, Cincinnati, lathes.

Max Ams Machine Company, Mt. Vernon, N. Y., sheet metal working machinery.

Jno. Hy. Andrew & Co., Ltd., Sheffield, England, tool steel and dies.

Armstrong Bros. Tool Company, Chicago, lathes, planers and drilling machines.

E. C. Atkins & Co., Indianapolis, saws.

Aurora Tool Works, Aurora, Ind., drill presses.

E. W. Bliss Company, Brooklyn, sheet metal working machinery.

Builders Iron Foundry, Providence, R. I., grinding and polishing machinery.

Carborundum Company, Niagara Falls, grinding materials.

Cincinnati Electrical Tool Company, Cincinnati, electric driven tools.

Cincinnati Iron & Steel Company, Cincinnati, lathes.

Dannemora Steel Works, Sheffield, England, tool steel.

Detroit Twist Drill Co., Detroit, drills.

Henry Disston & Sons, Inc., Philadelphia, files and saws.

Dreis & Krump Mfg. Company, Chicago, sheet metal working machinery.

General Electric Company, Schenectady, electric drills and grinding machines.

Germantown Tool Works, Philadelphia, machinists' hammers.

Gilro Machine Company, Oakland, Cal., power punch presses.

Gould & Eberhardt, Newark, N. J., shapers and gear cutters.

Grant Mfg. & Machine Company, Bridgeport, Conn., riveting machines.

Luther Grinder Mfg. Company, Milwaukee, tool grinders.

Henderson-Willis Company, St. Louis, oxy-acetylene equipment.

E. Horton & Son Company, Windsor Locks, Conn., lathe and drill chucks.

Hydraulic Press Mfg. Company, Mt. Gilead, Ohio, hydraulic presses, pumps and valves.

Kempsmith Mfg. Company, Milwaukee, milling machines.

Keystone Driller Company, Beaver Falls, Pa., drilling machines and pumps.

Lagonda Mfg. Company, Springfield, Ohio, valve seating machines.

Landis Tool Company, Waynesboro, Pa., grinding and boring machines.

Lea-Courtenay Company, Inc., New York, cold steel saws.

MacLeod Company, Cincinnati, oxy-acetylene equipment and sand blasting machines.

Mitts & Merrill, Saginaw, Mich., key-seating machines.

Morton Mfg. Company, Muskegon Heights, Mich., machine tools.

Niagara Machine & Tool Works, Buffalo, sheet metal working tools and machinery.

J. Ohlen & Sons Saw Mfg. Company, Columbus, Ohio, pipe cutting and threading machines.

Pacific Tank & Pipe Company, special lathes.

Quality Saw & Tool Works, Chicago, hack saws.

Reed Mfg. Company, Erie, Pa., vises, dies and pipe cutters.

Rockford Machine Tool Company, Rockford, Ill., drill presses.

Simonds Mfg. Company, Fitchburg, Mass., saws.

Smith & Mills Company, Cincinnati, machine tools.

Spear & Son Company, Boston, grinding and abrasive materials.

Stockbridge Machine Company, Worcester, machine tools.

Superior Corundum Wheel Company, Waltham, Mass., grinding and abrasive materials.

Temco Electric Motor Company, Leipsic, Ohio, electric driven buffers, grinders, etc.

Union Caliper Company, Orange, Mass., mechanics' hand tools.

U. S. Electrical Tool Company, Cincinnati, electric hand drills and grinders.

U. S. Steel Corporation, tool steels.

Warner & Swasey Company, Cleveland, machine tools.

Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., drop forging machinery.

Watson-Stillman Company, New York, hydraulic machinery and packing.

Western Tool & Mfg. Company, Springfield, Ohio, machine shop accessories.

Westinghouse Electric & Mfg. Company, electric welding display, pulleys, tool rests, motors with attachments, etc.

J. H. Williams & Co, Brooklyn, drop forged tools.

Williams Tool Company, Erie, Pa., pipe threading machines.

GENERAL MACHINERY AND ACCESSORIES

Advance Pump & Compressor Company, Battle Creek, Mich., pumps.

Aldrich Pump Company, Allentown, Pa., power pumps.

American Cast Iron Pipe Company, Birmingham, Ala., pipe.

American Clutch Company, Amesbury, Mass., friction clutches and pulleys.

American Hoist & Derrick Company, St. Paul, steam hoists.

American Pulley Company, Philadelphia, steel pulleys.

American Steam Pump Company, Battle Creek, Mich., pumps and compressors.

American Well Works, Aurora, Ill., power pumps.

Baker-Hansen Mfg. Company, East Oakland, Cal., air compressors.

Bessemer Gas Engine Company, Grove City, Pa., gas and oil engines.

Bond Foundry & Machine Company, Manheim, Pa., power transmitting machinery.

Chas. Bond Company, Philadelphia, leather belting.

Bristol Company, Waterbury, Conn., belt lacings, rivets and recording instruments.

Brown Portable Elevator Company, Chicago, conveying and elevating machinery.

Canadian Bond Hanger & Coupling Company, Ltd., Alexandria, Ont., power transmitting machinery.

Chain Belt Company, Milwaukee, chain belting and elevator buckets.

Chisholm & Moore Mfg. Company, Cleveland, chain hoists and traveling cranes.

Clyde Iron Works, Duluth, hoisting and excavating machinery.

Cowan Truck Company, Holyoke, Mass., industrial works trucks.

Crane Company, Chicago, valves and fittings.

Cumberland Steel Company, Cumberland, Md., ground shafting.

Cyclops Iron Works, San Francisco, traveling cranes.

Dodge Mfg. Company, Mishawaka, Ind., conveying machinery, transmission rope drive, etc.

Economy Engineering Company, Chicago, hoisting machinery, portable elevators, etc.

Falk Company, Milwaukee, gears.

Flory Mfg. Company, Bangor, Pa., hoisting engines.

International Acheson Graphite Company, Niagara Falls, lubricants.

Joyce-Cridland Company, Dayton, Ohio, lifting jacks.

Link Belt Company, Philadelphia, chain drives.

J. F. Lucey Company, Pittsburgh, pumps.

Lunkenheimer Company, Cincinnati, lubricators, oil cups, etc.

Minnesota Manufacturers Association, N. St. Paul, Minn., conveying machinery.

National Brake & Electric Company, Milwaukee, air compressors.

New London Ship & Engine Company, Groton, Conn., air compressors.

Owen Bucket Company, Cleveland, excavating machinery.

Pawling & Harnischfeger Company, Milwaukee.

Pelton Water Wheel Company, pumps.

Pittsburgh-Des Moines Steel Company, Pittsburgh, tanks.

Reeves Pulley Company, Columbus, Ind., variable speed transmission device.

Saginaw Mfg. Company, Saginaw, Mich., wood split pulleys.

Sangamo Electric Company, Springfield, Ill., electric lighting units.

Chas. A. Schieren Company, New York, leather belting.

Shepard Electric Crane & Hoist Company, Montour Falls, N. Y., electric cranes.

Standard Pressed Steel Company, Philadelphia, steel shaft hangers.

Standard Woven Fabric Company, Framingham, Mass., woven belting.

E. D. Wood & Co., Philadelphia, cast-iron pipe, gas producers, pumps, etc.

Yarnall-Waring Company, Philadelphia, water valves.

STEAM GENERATORS, ETC.

Ashton Valve Company, Boston, valves and gauges.

Babcock & Wilcox Company, New York, boilers.

Badenhausen Company, Philadelphia, water tube boilers.

Crosby Steam Gauge & Valve Company, Boston, recording instruments.

Harrison Safety Boiler Works, Philadelphia, feed-water heaters, etc.

Hill Pump Valve Company, Chicago, pump valves.

Hoppes Mfg. Company, Springfield, Ohio, water heaters.

Industrial Instrument Company, Foxboro, Mass., indicating and recording instruments.

McIntosh & Seymour Corporation, Auburn, N. Y., Diesel oil engines, etc.

Nelson Valve Company, Philadelphia, valves.

Pennsylvania Flexible Metallic Tubing Company, Philadelphia.

Pratt & Cady Company, Inc., Hartford, valves.

W. S. Ray Mfg. Company, San Francisco, oil burning systems.

Schaeffer & Budenberg Mfg. Company, Brooklyn, tachometers, etc.

Smith & Watson Iron Works, Portland, Ore., oil burning equipment.

INTERNAL COMBUSTION ENGINES

Busch-Sulzer Bros. Diesel Engine Company, St. Louis.

Fulton Mfg. Company, Erie, Pa.

Holmes Motor Company, Boston.

Loew-Victor Engine Company, Chicago.

August Mietz, New York.

Venn-Severin Company, Chicago.

An involuntary petition in bankruptcy against the John Rohan & Sons Boiler Works Company, St. Louis, has been filed in the United States District Court by five creditors with claims aggregating $412.92. The case has been set for hearing March 20. Since October 21 the plant has been operated by the directors under the supervision of a committee of creditors. President John Rohan declares that the company is not insolvent, though its debts aggregate about $60,000. The financial troubles caused by the war are claimed to be the cause.

The net surplus of freight cars on the railroads of the United States and Canada on March 1 was 303,987, representing an increase of 24,576 cars in February. The surplus at the beginning of this month was the largest reported since January in 1909, when it was 332,513. On March 1, 1914, the net surplus was 153,907.

Handy & Harman, dealers in bullion and bonds, 59 Cedar street, New York, have let the contract for a new building at Bridgeport, Conn., for their silver rolling mills. As much of the present machinery at Bridgeport will be used as possible.

Preliminary returns of the exportation of iron ore from the Swedish port of Narvik in 1914 show a decline of more than 1,000,000 tons from 1913, estimates being 2,316,014 tons in 1914 and 3,384,000 tons in 1913.

Labor Problems in England and France

The observations of a representative of a machinery house who recently returned from abroad furnish some interesting sidelights on various labor conditions created by the war in England and France. All shops in both countries which can make any kind of materials needed by the armies in the field are extremely busy, and in both countries there is a shortage of labor. England is manufacturing not only for her own needs but for all of the allied countries as well. A certain proportion of mechanics and laborers were kept at home, but these are insufficient and a much larger number of women and girls are employed than usual. They always have been employed to a considerable extent on light machine work and assembling, but their number has been greatly increased.

To protect from derision and scoffing the workingmen who have stayed at home to work on the materials needed to prosecute the war, novel means have been employed. Lord Kitchener realized the situation which might arise in this respect and caused a circular letter to be spread broadcast in which he stated that any man who worked in the shops to help supply the nation's needs was doing his duty as much as the man in the trenches. Facsimiles of the letters have been printed on cards which workingmen may carry in their pockets. Another plan in operation is the supplying to the men of small badges stamped with the British crown and the words O. H. M. S. (On His Majesty's Service.)

In France the shortage of skilled men in the shops is so great that many men have been taken from the trenches. If a man is a lathe hand, for instance, he is taken from the field and placed on a lathe in one of the shops engaged in making war material.

The returned traveler says he would not be at all surprised if England should follow the example of Russia in the matter of intoxicating liquors and close all "public houses."

Lake Superior Iron Ore Analyses

Four new Lake Superior ores are listed in the 1915 ore analysis book of Oglebay, Norton & Co., Cleveland, Ohio. One is the Quebec, a granular red hematite ore from the Ottawa mine in the Gogebic range. Two others are the Judson and the Camden red hematite from the Mastodon district, Menominee range, and the fourth is the Knox ore, a coarse hematite from the Mesaba range. All the ores listed in 1914 are included in this year's analysis book.

The same 18 ores are offered by E. N. Breitung & Co., Cleveland, in their analysis book for 1915 as were listed last year, though there are some slight changes in analysis, as determined by averages of 1914 shipments. All the ores are from the Marquette range with the exception of the Randville silicious ore from the Menominee range, and the Algoma ore, a Bessemer, mined by the Breitung Iron Company of Canada on the Michipicoten range.

W. P. Snyder & Co. Ores for 1915

The Shenango Furnace Company and W. P. Snyder & Co. in putting out their Lake Superior iron ore analyses for 1915 list the same ores as heretofore—the Shenango and Webb Bessemer ores and the Wilpen, Web band Whiteside non-Bessemer ores of the Mesaba range and the Clifford and Antoine silicious ores of the Menominee range. In the case of the Webb Bessemer ore there is a marked increase in the iron content. The analysis shown in the 1915 list gives 60.47 per cent. metallic iron, 0.040 phosphorus and 6.93 silica, as against 53.58 per cent. metallic iron, 0.054 phosphorus and 14.27 silica in the list of 1914.

Ishpeming, Mich., the important iron mining center of the Marquette range, is considering the adoption of Eastern time, which would set all the clocks of the city ahead one hour as was done at Cleveland on May 1, 1914. The object of the change is to get more daylight hours in the working portion of the 24 and to give the workers in the community more daylight hours for recreation.

Machinery Markets and News of the Works

The pressure of demand which can be attributed directly or indirectly to the war is as great as ever, while that from industrial sources continues to improve. Big deals in the types of tools required to make munitions of war are frequent. In New York a betterment in commonplace, domestic demand is conceded. New England continues busy and no reaction is expected in case hostilities end abruptly, as transactions have been carefully guarded. The volume of orders is better in Detroit, largely because of domestic demand. In Cleveland automobile and tire manufacturers are active purchasers. The value of business placed in Cincinnati since the beginning of the war amounts to millions. In that city makers of shaping machines are taking up the manufacture of tools which are in greater demand. In Milwaukee many tool builders are running double-shifts, although heavy machinery is dull. New enterprises are being developed in the Central South, especially public utility projects, and conditions look better. The machine tool trade is quiet in Birmingham, but saw-mills are taking more interest in equipment and supplies. The feature in Texas is the increased number of municipal improvements. The machinery trade in St. Louis has been quieter with most of the demand for single tools. In the Pacific Northwest the larger shops are getting a better volume of work and inquiries for single tools and small lists are a little more numerous.

New York

NEW YORK, March 16, 1915.

Activity of the kind which has prevailed for several weeks continues to keep a considerable part of the machine-tool trade busy. A little betterment in domestic industrial demand is conceded almost everywhere, but the fact remains that the big business is in those machines that can be used in the manufacture of shrapnel, lyddite shells or projectiles. Inquiries are as plentiful as ever; while, of course, many of them will never come to an issue, as has been the case so many times heretofore, others will result in business. The Bethlehem Steel Company is out with another list of over 100 turret lathes, some of them of extra large spindle capacity. The Baldwin Locomotive Works, Philadelphia, has again been a purchaser of a large number of turret lathes, it is believed for export, though the company is known to have been figuring on making shells. The difficulty with turret lathes at this juncture is getting deliveries that are not many months away. The American & British Mfg. Company, Bridgeport, Conn., which is understood to have a sub-contract for the making of shrapnel, has been a recent purchaser of tools.

A few machines have been purchased by Brewster & Co., Long Island City, who are to enter the field as builders of automobiles. Other orders are pending. The firm has been importing automobiles and making automobile bodies. Another interest in the automobile field which has been a recent buyer is the Norma Company, New York, whose product is ball bearings.

The Bush Terminal Company, 100 Broad street, New York City, has leased spaces in its manufacturing buildings as follows: Acme Die Casting Company, 6200 sq. ft.; E. W. Bliss Company, 60,000 sq. ft.; Boulevard Machine Company, 1680 sq. ft.; Vant Woud Rubber Company, 7249 sq. ft. H. F. H. Ried is secretary to the president.

The Turner Construction Company, 11 Broadway, New York City, has been awarded the contract for the construction of a three-story building of irregular shape, 65 x 90 x 277 ft., to be erected for the Standard Oil Company, Pratt Works, at Blissville, L. I., N. Y., of reinforced concrete.

The Mayville Mfg. Company, Mayville, N. Y., has been incorporated with a capital stock of $15,000 by W. J. Cook, J. G. Cornell and Orrin Towner, to manufacture patented trees and neck yokes. The company will locate its factory and offices at Mayville, N. Y., and requires the following machinery: Motors, gas engines, automatic lathes, bolt cutters, saws, castings and pulleys. W. J. Cook is secretary.

The New Rochelle Hospital Association, New Rochelle, N. Y., is taking bids this week for the erection and equipment of a one and three-story addition to its power house and service building at an estimated cost of $70,000. H. J. Parker, 46 East Forty-first street, New York City, is president.

The Crosby Company, Buffalo, manufacturer of stamped and pressed metals, has specifications out for a turret lathe which it will add to its equipment.

Pierce, Butler & Pierce, 282 James street, Syracuse, N. Y., will add a two-story pattern building 40 x 60 ft., of brick and steel construction.

A boiler house addition, 40 x 59 ft., is being made to the laundry plant of James F. Leahy, Utica, N. Y.

The Rapid Drill Company, Geneva, N. Y., has filed articles of incorporation to manufacture drills, etc. The capital stock is $25,000. William O'Hanlon, J. C. Rose and W. E. Sill are the incorporators.

The agricultural implement plant and equipment of Henry & Allen, Auburn, N. Y., was damaged by fire recently to the extent of $15,000.

A. L. Allegretti, manufacturer of razor strops, etc., Geneva, N. Y., will this spring erect a factory 60 x 150 ft., two stories.

The Union Cutlery Company, Olean, N. Y., capitalized at $75,000, has filed articles of incorporation to manufacture cutlery, razor strops, hones and manicuring articles. A. Hunt and J. W. Brown, Little Valley, N. Y., and W. R. Brown, Olean, are the incorporators.

Bids are to be asked for the remodeling of the electric lighting plant of the village water and light plant, Wellsville, N. Y. Plans are being prepared by H. B. Sweet, consulting engineer, Utica, N. Y.

Peter Lammerts, 549 Sixth street, Niagara Falls, N. Y., will build a 50 x 60 ft. addition to his carriage and automobile works.

Brockport, N. Y., has engaged Charles C. Hopkins, 349 Cutler Building, Rochester, to prepare plans for enlarging and improving its sewage disposal works at an estimated cost of $25,000.

The Riverhead Electric Light Company, Riverhead, N. Y., of which F. Carl Hallet is manager, will install a 19 x 20-in. Skinner universal engine direct-connected to a 140-kw two-phase 60-cycle 2300-volt generator.

The Finance Committee of the Board of Aldermen, Buffalo, has approved a bond issue of $569,382 for the improvement of the water system. Daniel J. Sweeney is city clerk and Henry L. Lyon, deputy water commissioner.

Philadelphia

PHILADELPHIA, PA., March 15, 1915.

E. E. Brown & Co., manufacturers of sash weights, McKean and Meadow streets, Philadelphia, have awarded the contract to Doyle & Co., 1519 Sansom street, for the reconstruction of their foundry, recently damaged by fire. It will be repaired and improved at an estimated cost of $12,000. T. Howard Brown is treasurer.

The Animal Products Company, Trenton avenue and Tioga street, Philadelphia, has awarded the contract to Robert Beatty & Bro., 2321 East Fletcher street, Philadelphia, for the erection of a two-story and basement factory, 64 x 158 ft., and a one-story power house, 21 x 74 ft.

The George B. Jackson Company, Westminster, Md., has secured a factory at Guelph, Ont., and will manufacture railroad signals, torpedoes and fuses.

The Atlantic Can Company, Aliceanna and Chester streets, Baltimore, Md., has had plans drawn by William O. Sparklin, architect, 502 Law Building, Baltimore, and has let contract for the erection of a five-story brick and frame factory, 60 x 162 ft.

The Dixie Lumber Company, Clifton Forge, Va., will purchase wood-working machinery for the manufacture of bungs.

The International Tool Company, Detroit, will remove its plant to Newport News, Va., and will erect a frame and corrugated iron building, 50 x 100 ft. Tools and hardware specialties will be manufactured. I. H. Case is president.

Stickley Brothers, Strasburg, Va., will establish an ice factory and cold storage plant.

The Grundy Light & Power Company, Grundy, Va., will purchase additional power equipment at a cost of $3000. The plant is to generate 100 hp. H. M. Johnson is manager.

New England

BOSTON, MASS., March 16, 1915.

The whole trend of demand for machine tools to be used in the manufacture of war materials has changed in the last fortnight. The shrapnel proposition has become secondary to inquiries for machinery to produce shells of larger caliber. Most conspicuous of the products named is the 4½-in. lyddite shell. But the heavy gun ammunition is almost equally prominent. Machines for turning and machines for grinding shells up to 10-in. and 12-in. are actively sought. In the extraordinary rush for shrapnel ammunition and the equipment for making it, the supply of 14, 16 and 18-in. lathes was practically exhausted. The grinding machines and the automatics of corresponding sizes were in equal demand. Builders of these classes of machinery are loaded with orders for shipment to Europe or for use in those American works that are producing shells of approximately 3-in. caliber. Now, with this new demand, the manufacturers of lathes have practically exhausted their supplies of the heavier machines, ranging from the 20-in. to the 36-in., and are booking most encouraging orders. Their works will be operating at even greater capacity.

It should not be lost sight of that all this tremendous business is practically for cash. It may be divided between the machines shipped to foreign customers, not agents, which are paid for before shipment; machines shipped to foreign representatives, most of which business is settled f.o.b. the factory or the dock; or to American customers whose credits are established. The machine-tool builder takes no risk. If the war should end tomorrow few machines could be thrown back on his hands.

The New England foundries should profit by this new business. Many of them are working to capacity, furnishing castings for the medium-sized lathes, grinding machines and automatics, and, of course, the somewhat wide variety of machinery which enters into arsenal equipment. Probably those foundries which have not been in close touch with the machine-tool industry, and have been correspondingly inactive, will be called upon to furnish a large amount of castings. The demand for pig iron in the New England territory should be somewhat more pronounced.

The Clinton Wire Cloth Company, Clinton, Mass., has awarded the contract for a perforating factory, 58 x 224 ft., one story, to be located on the site of the old galvanizing building, which will be torn down.

The American Graphaphone Company, Bridgeport, Conn., has begun work on two additional buildings, one 60 x 100 ft., the other 50 x 145 ft., their purpose being to increase the output of talking machine records.

The Case Paper Company, Manchester, Conn., will rebuild the main mill which was burned last week with a loss of $200,000. This part of the company's plant had been very active.

The Connecticut Telephone & Electric Company, Meriden, Conn., will increase its factory by adding two stories to a structure 40 x 140 ft.

The P. J. Flannery Company, New Britain, Conn., will erect a factory, 145 ft. front, 128 ft. long, and 80 ft. in the rear.

The factory of the Ramsdell Specialty Company, Worcester, Mass., manufacturer of screw machine products, was destroyed by fire March 15, with a loss of over $15,000.

Chicago

CHICAGO, ILL., March 15, 1915.

The stream of foreign business continues to run so strongly that new evidences of its volume seem to have lost much of their novelty and interest. Orders with the machine tool builders are still increasing. The Chicago Screw Company is reported to have placed orders for a number of screw machines which will be used in filling a European order. Domestic demand is in sharp contrast, and manufacturers who are in need of new equipment are largely dependent upon machinery dealers' stocks. The National Automatic Tool Company, Richmond, Ind., is building a large addition and is buying tools. It is one of the few tool makers whose regular business is compelling the expansion of facilities. A manufacturer of wood-working machinery of Rockford, Ill., is reported to have acquired equipment for manufacturing a turret-lathe formerly built by the Modern Machine Tool Company.

Joseph T. Ryerson & Son have recently received orders covering several hundred machine tools; principally 230 turning lathes, 91 turret lathes, 18 Ryerson friction saws, for shipment to France and Russia. A large part of this order has been placed with American manufacturers, the balance being manufactured in shops associated with Joseph T. Ryerson & Son.

The Chicago Faucet Company, 313 South Clinton street, Chicago, manufacturer of plumbers' supplies, will erect a foundry and machine shop 50 x 125 ft., not 25 x 50 ft., as has been reported. No foundry equipment will be purchased until a foundry superintendent has been selected. A. C. Brown is president.

The Chicago Spring Butt Company, Chicago, suffered a loss by fire March 14, estimated at $50,000.

Adams Brothers, 1720 North Kedzie avenue, Chicago, manufacturers of motor cars for railway inspection, have moved to 3914 Costello avenue.

The Anderson Ratchet Company, Chicago, has been incorporated by Anton T. Anderson, 1149 Austin avenue, William Daniel, Calvin R. Ocker and Harvey H. Daniel, with $5000 capital stock, and will manufacture wrenches, tools and other merchandise.

The Economy Engineering Company, 415 South Washtenaw avenue, Chicago, builder of portable elevators, warehouse equipment and tiering machines, has added a building to its plant to provide for more extensive erection and testing facilities. It was needed for the increased demand for the manufacture of its steel barrel storage racks.

The Ozone Machinery Company, Chicago, has been incorporated with a capital stock of $30,000 by T. A. Lydon, A. Friedman and W. D. Cameron, 2944 Mildred avenue, to manufacture air conditioning apparatus.

The Hot Point Electric Heating Company, manufacturer of electric heating and cooking appliances, is now installed in its new factory at 2240 Ogden avenue, Chicago. The new plant has a floor area of 40,000 sq. ft.

The city of Chicago will erect an electrical plant at Stony Island avenue and East Ninety-fifth street, to be run by the waste heat from the garbage incinerator.

The Kellogg-Mackay Equipment Company, Chicago, has been incorporated with a capital stock of $100,000 to manufacture automobile sprinklers and sprinkling systems for buildings. The incorporators are C. V. Kellogg, William Grimshaw and Fred W. Fix, 1246 Jarvis avenue, Rogers Park, Chicago.

The Johnson Variable Speed Gear Company, Chicago, has been incorporated with a capital stock of $25,000 by Charles E. Sullivan, Clinton A. Johnson, 6921 South Oakley avenue, and Ole C. Oleson. It will handle automobile equipment and specialties.

The German-American Ball Bearing Mfg. Company, Chicago, is about to erect a one-story factory, 47 x 122 ft., at a cost of $12,000. The plans were prepared by George F. Poulsen, architect.

The Henderson County Drainage District No. 3, Oquawka, Ill., will receive bids until 11 a.m. March 20 for a complete oil or gas engine driven pumping plant.

Fire at Quincy, Ill., has destroyed the plant of the Mulliner Box & Planing Mill Company, with a loss of $30,000. It will be replaced.

The Fairmont Machine Company, Fairmont, Minn., has made application for a change of its name to the Fairmont Gas Engine & Railway Motor Company, to indicate its product more clearly.

John L. Pritchett and E. T. Cushman, Ft. Madison, Iowa, have formed a partnership and will do general machine shop and garage work.

The Chisholm Electric Company, Chisholm, Minn., will soon construct an extension to its plant, estimated to cost $50,000.

Milwaukee

MILWAUKEE, WIS., March 15, 1915.

Since January 1 employment conditions in metal-working establishments have improved from 17 to 20 per cent. and the improvement experienced during the first half of March indicates a sound acceleration. Machine-tool builders are working with full forces and some shops are operating 16 and 24 hours per day to accommodate the rush of export business. Domestic business shows slight but steady improvement. Heavy machinery is still dull. Business in prime movers is confined almost exclusively to municipalities, although a little trade originates from needed replacement work. A number of local machinery manufacturers are sharing in an equipment order totalling $50,000, for a wood-working interest in Milwaukee. The Milwaukee railroad

shops have added another 100 men to the locomotive building force but still fail to come into the tool market. The Jeffery Company, Kenosha, has booked an automobile truck order for export amounting to $1,000,000 and Racine and Kenosha wagon makers are working at capacity to fill requirements of the allied armies. The Milwaukee bank statements, March 8, show the largest aggregate deposits in the history of the city.

The Thilmany Pulp & Paper Company, Kaukauna, Wis., is ready to start work on the erection of a factory and warehouse. The finishing shop will be of brick and steel, two stories, 72 x 220 ft., and the storehouse 40 x 140 ft., of concrete. Equipment contracts have been placed.

The Wisconsin Pearl Button Company, LaCrosse, Wis., is about to erect a factory addition, fireproof construction, 80 x 125 ft., one story, to cost $20,000. Daniel W. McMillan is president.

The J. I. Case Threshing Machine Company, Racine, Wis., is having plans made for a warehouse and office for the accommodation of its branch house at Madison, Wis. C. L. Doring is manager. It will be of brick and mill construction, one story, 100 x 140 ft., and will cost $30,000. A garage and repair shop will be provided.

The Putzke Air Electric Light & Power Company, Portage, Wis., organized recently with $50,000 capital, is making plans for the development of a wind engine, similar to a windmill, for the generation of electricity, for farm use, with storage battery systems.

Patrick Cranston, Richland Center, Wis., has established a shop for the manufacture of milk coolers and other creamery and cheese-making equipment.

The Nelson-Indra Machinery Company, Green Bay, Wis., has purchased a list of machinery and equipment from the receiver of the American Voiturette Company, Detroit, and will market that which remains after supplying its own needs.

The Jerome Kidder Mfg. Company, New York, electrotherapeutic instruments and apparatus, has moved its plant and offices to Poynette, Wis., the residence of Francis M. Kidder, president, and Milton H. Kidder, secretary. Requirements are being filled as needed.

The Storle Rotary Engine Company, Kewaunee, Wis., is preparing to start actual manufacturing operations on a new type of rotary valve internal combustion engine for automobile and motor truck use. The concern was incorporated by O. O. Storle, inventor and designer, several months ago, and has since then been developing its product.

John L. Rudolph, Courtney, N. D., is establishing a garage and machine shop at Cashton, Wis., and has leased a shop.

The Oneida Boat Company, Rhinelander, Wis., of which W. E. Cleveland is the owner, will erect a shop addition, 22 x 40 ft.

The Pahl Mfg. Company, Third and Center streets, Milwaukee, manufacturer of go-carts and baby carriages, will erect a brick addition, 25 x 150 ft., three stories. C. R. Ringer & Son, Hathaway Building, are the architects.

The Milwaukee Steel Type & Die Company, formerly the L. E. Larson Company, Chicago, has removed to 258 Jefferson street, Milwaukee, Wis., where larger facilities and more extensive equipment are available.

The Modern Steel Structural Company, Waukesha, Wis., has filed an amendment changing its name to the Federal Bridge Company.

Indianapolis

INDIANAPOLIS, IND., March 15, 1915.

The Electric Furnace Company of America, Indianapolis, has been incorporated with $30,000 capital stock, to manufacture electrical furnaces by Henry H. Buckman, Jr., George A. Pritchard and Thomas E. Buckman.

The Fuerst-Kerber Cut Stone Company, Bedford, Ind., has increased its capital stock to $500,000.

Robert Hunter, Providence, Ky., who has large furniture manufacturing interests, has purchased a concrete and brick building at Oakland City, Ind.

Fire destroyed the plant of the Bogda Neal Cooperage Company, Plymouth, Ind., March 10, causing a loss of $15,000.

The Hill Standard Mfg. Company, Anderson, Ind., manufacturer of toy vehicles, will also manufacture wire wheels for agricultural implements, it is announced. The Anderson Foundry & Machine Company, Anderson, has the contract for the new machinery equipment.

The LaPorte Outing Sulky Company, LaPorte, Ind., has been incorporated with $45,000 capital stock, to manufacture children's vehicles and novelties. The directors are Emmett Scott, R. H. Brown and Orville E. McCarver.

The Brazil Stamping & Mfg. Company, Brazil, Ind., has increased its capital stock by $10,000.

The Mooresville Public Service Company, Mooresville, Ind., has been incorporated with $75,000 capital stock to supply heat, light and power. The directors are Percy C. Hord, Leander J. Monks and Henry C. Starr.

The Crawfordsville Shale Brick Company, Crawfordsville, Ind., has increased its capital stock from $50,000 to $75,000.

The Ft. Wayne Ironing Board Company, Ft. Wayne, Ind., has been incorporated with $10,000 capital stock to manufacture ironing boards by A. D. and C. Palmer and J. W. Romick.

The Hoosier Coil Company, South Bend, Ind., has been incorporated with $35,000 capital stock to manufacture novelties and appliances using internal combustion engines. The directors are A. W. Fisher, J. O. Rome and H. B. Snell.

The Green Mfg. Company, Marion, Ind., has been incorporated to manufacture metal, wood and leather articles. H. L. Green, P. R., and E. M. Simmons are the incorporators.

The equipment of the South Bend Casket Hardware Company, South Bend, Ind., has been bought by Harry Burris, W. M. Goodwin and Howard Boor, Newcastle, Ind., and it will be moved to Newcastle, where a factory has been leased. The company will manufacture hardware for coffins.

The North Vernon Stove Company, North Vernon, Ind., has been dissolved.

The Howard Machine Company, Goshen, Ind., has been incorporated with a capital of $10,000 by E. A. Dausman, Guy Dausman and Ira Howard.

Detroit

DETROIT, MICH., March 15, 1915.

A better volume of orders is being received by machinery dealers, and this demand for equipment is coming from various sources and seems to indicate a favorable outlook. Detroit business is no doubt in some part responsible for considerable of the activity in many lines; but domestic business seems also to be on the increase. Second-hand machinery is reported rather quiet; but a limited demand has set in for rebuilt machinery in good condition. The spring elections which are to be held April 5 will place before the taxpayers a large number of propositions for the erection of power, light and waterworks plant and business is expected to be derived therefrom. Building still continues light and with little construction of interest to the machinery trade.

The Security Signal Company, Detroit, has been incorporated with a capital stock of $20,000 to manufacture electric signaling devices for automobiles and motor trucks. Factory space has been arranged for. M. A. and W. S. Reynolds and G. C. Tremaine are the incorporators.

The S. R. K. Motor Company, Detroit, has been organized with $100,000 capital stock to manufacture automobiles and automobile parts. The principal stockholders are Thomas D. Knight, Frederick T. Ranney and Clarence B. Strouse.

The Federal Mfg. Company, Detroit, has been organized by David W. Reinhohl, Thomas S. Merril and A. McCreed to manufacture automobile accessories. It is capitalized at $5000.

The Kosmath Company, Detroit, a $50,000 corporation, has been organized to manufacture motor vehicles and parts. Edward T. Birdsall is the principal stockholder.

The Detroit Cornice & Slate Company, Detroit, has been incorporated with $5000 capital stock to manufacture sheet metal work and other roofing materials. Frank A. Hesse and John G. George are the promoters.

The taxpayers at Marion, Mich., have voted $5000 for the erection of a pumping station.

The Engberg Electrical Company, St. Joseph, Mich., manufacturer of electrical devices, is planning to increase its facilities by the erection of a building to cost $20,000.

The Blood Brothers Machine Company, Allegan, Mich., manufacturer of automobiles and universal joints, has increased its capital stock from $75,000 to $250,000. No immediate enlargement of the plant is contemplated.

The Spencer-Smith Machine Company, Howell, Mich., is making extensive improvements to its plant, including the installation of additional electrical equipment. It reports a good volume of orders.

Charles Smith and T. S. Smith, Houghton, Mich., have organized the Smith Wagon Brake Company and will manufacture wagon brakes.

The Michigan Wire Goods Company, Niles, Mich., will, in addition to erecting the factory recently reported, build a power house and tinning room 40 x 50 ft.

The plant of the Detroit Foundry Company, Fordyce and Marston avenues, Detroit, was totally destroyed by fire March 12, with a loss estimated at $100,000. The buildings were owned by the American Motor Castings Company. The principal product of the company was automobile chassis. No information as to the rebuilding of the plant is available.

Fire in the Benton Harbor (Mich.) yards of the Big Four railroad destroyed the roundhouse and a quantity of rolling stock.

Cincinnati

CINCINNATI, OHIO, March 15, 1915.

A conservative estimate of business received by local machine-tool builders since the war in Europe started is placed between $6,000,000 and $7,000,000. If the machine-tool makers at Hamilton are included, the last-named figure is doubtless nearer the mark. The first orders placed called for small and medium-sized lathes but those coming in now are for the medium and larger sizes. An almost phenomenal demand for milling machines, mostly of the vertical type, has set in, while recently makers of grinding machines report the receipt of some good business from abroad. Builders of radial drilling machinery also note an improvement, and the shaper is practically the only machine tool for which but a limited demand is found. Shaper manufacturers, however, are turning their attention to other kinds of machines, and one large company is now operating on full time making milling machines. A leading firm at Hamilton, Ohio, whose plant has been almost idle for some time, is now running on full time and with almost a full force, making lathes for one of its Eastern branches, although it has not made this class of machinery in a number of years.

It is understood that on August 1, last year, there were large stocks of machine tools at the different plants, as well as quite a number out on consignment with agents. As far as lathes and milling machines are concerned these stocks have been wiped out, and more than one local firm has enough business on its books to operate until January 1 next. The sudden cessation of the war in Europe would doubtless cause the cancellation of a number of orders, but it is understood that most of the business now accepted is contingent on the customer taking delivery of the machines regardless of conditions in Europe.

The local labor situation is rather peculiar. According to the report of an officer of the Associated Charities Association, approximately 9000 men in Cincinnati are out of employment. Reliable skilled help, however, is urgently needed and unobtainable.

The Bader-Giebel Machine Company, Cincinnati, has been incorporated by William C. Bader, George A. Giebel and others, with $15,000 capital stock to operate a general machine shop. It has leased a building at 3089 Colerain avenue, which is being fitted up with the necessary machinery. Included in its list of requirements are the following machines:

One 14-in. lathe.
One 20-in. shaping machine.
One 3½-ft. radial drilling machine.
One 36-in. x 14-ft. planer.
One hacksaw.

The Boxill & Bruel Machinery Company, 125 East Fifth street, Cincinnati, has been incorporated with $15,000 capital stock, and will market a portable grinder for gas engine cylinders that it is having made under contract.

The Schuchert Pattern Works, Cincinnati, of which A. E. Schuchert is president, has moved its plant from 119 East Seventh street to 809 Broadway.

The Charles Behlen Sons Company, Cincinnati, has commenced the construction of a large addition to its garage on Rockdale avenue.

The Crites Carburetor Company, Hamilton, Ohio, has been incorporated with $50,000 capital stock, by J. W. Quinne, R. L. Blagg and others. Nothing is yet known as to its manufacturing plans.

The Ensign Motor Company, Springfield, Ohio, has been incorporated with $30,000 capital stock, by Harry C. Ensign and others. It will operate a garage and small repair shop.

The Chamber of Commerce, Columbus, Ohio, announces that the Watson Solar Window Company, manufacturer of metal windows and doors, Chicago, Ill., has made arrangements for moving its plant to Columbus.

The Globe Steam Laundry Company, Dayton, Ohio, has been incorporated with $50,000 capital stock, by August Snyder and others. Power plant and other equipment will probably be required.

The Cambridge Ice & Storage Company, Cambridge, Ohio, has been incorporated with $100,000 capital stock to erect an ice plant. John H. Theade and D. B. Spitzer are named among the incorporators.

A planing mill will be erected by Dice Brothers, Xenia, Ohio. It is understood that most of the equipment has been purchased.

It is reported that the McGuire Handle Company, Prospect, Ohio, has made arrangements to move its plant to Anderson, Ind. New equipment will be added to increase its capacity.

John Morner, Shelbyville, Ind., has purchased a factory owned by the Shelbyville Chamber of Commerce. It will be fitted up as a wood-working plant.

Cleveland

CLEVELAND, OHIO, March 15, 1915.

Dealers are doing a very satisfactory volume of business in small lots and single tools. Considerable business is coming from the automobile trade. An Indianapolis automobile company is placing orders in Cleveland for lathes, screw machines, punch presses and other equipment that will aggregate about $15,000. Lathes, milling machines and boring mills for making war material are in active demand, some sales being made from dealers' stocks to manufacturers from other sections of the country who want machines for prompt shipment. The demand for boring mills from rubber plants and machine shops in Akron continues good. Tire manufacturers are understood to have taken heavy orders for tires for export necessitating an increase in their tire-mold making capacity.

The Frantz Premier Company, Cleveland, maker of electric vacuum cleaners, washing machines and small electric motors, now located in the Whitney Power Block, St. Clair avenue and East Twelfth street, will erect a large manufacturing plant at Ivanhoe road and the Nickel Plate Railroad. It has acquired a four-acre building site formerly owned by the Ohio Blower Company.

Sealed bids will be received by the commissioner of purchases and supplies, Cleveland, Ohio, March 26, for transformers for the municipal electric light department.

The Moser Pattern & Foundry Company, Newark, Ohio, will add a gray iron foundry to its present plant and make additions to its pattern shop and aluminum foundry. It makes wood and metal stove and machinery patterns, and specializes in aluminum match plates.

The Elyria Tire & Rubber Company, Elyria, Ohio, has been organized with a capital stock of $250,000 to establish a plant for the manufacture of solid rubber tires and other rubber products. The company expects to build a plant.

The Ohio Engine Company, Sandusky, Ohio, recently organized, will establish a plant in the factory building formerly occupied by the Sandusky Foundry & Machine Company. It is stated that these quarters will be only temporary and that the company expects to erect a new plant. Some new machinery is being purchased. Mack Joy is president.

The Johnson Mfg. Company, Urbana, Ohio, will enlarge its plant by the erection of a two-story brick and steel addition, 10 x 60 ft.

The Warren Specialty Mfg. Company, Warren, Ohio, has been incorporated with a capital stock of $25,000 by F. S. Hart, Frank D. Johns, S. S. McKenzie, and others, to manufacture electrical and mechanical specialties.

The Central South

LOUISVILLE, KY., March 15, 1915.

Business continues to look better in this part of the country. New manufacturing enterprises are being developed and public service properties are being improved and enlarged. The former feature, that of improvement, is also being given attention by manufacturers, most of whom have been holding back on such work. Some of the machinery concerns are urging companies whose factories are at present not busy, that now is the logical time to put in new equipment, while it can be done without interfering with operations. It is stated that this reasoning is producing results in a fair number of cases.

The Louisville Water Company is planning to spend $990,000 in improvements. An entire new pumping station, to cost $525,000, is in prospect, with a pumping capacity of 30,000,000 gal. A special wash-water pump for the filter plant will be installed at a cost of $10,000, etc. Bids on the equipment will be taken in a few weeks. James Wilson is chief engineer.

The paper box factory of the Franke A. Menne Candy Company, 541 East Madison street, Louisville, was burned March 13 with $30,000 loss. Power and special machinery

were destroyed. The company, which is a branch of the National Candy Company, St. Louis, will rebuild at once.

The plant of the United Safety Power Company, Jeffersontown, Ky., was damaged by fire last week. Some of the electrical equipment was burned.

The Commonwealth Invention Syndicate has been organized in Louisville with $30,000 capital stock for the purpose of promoting mechanical inventions. M. C. Fullenlove, L. L. Bristow and John P. Haswell, Jr., are the incorporators.

J. E. Gowdy, Campbellsville, Ky., is purchasing equipment for a wooden hub factory.

The sawmill of the Livingston Lumber Company, Livingston, Ky., was burned recently with a loss of $50,000. It will probably be rebuilt.

The Public Service Company, Hickman, Ky., will purchase a centrifugal pump with a capacity of 400 gal. per min. W. C. Morehead is in charge.

The Hunter Heater Company, New Orleans, La., will establish a plant in Lexington, Ky. W. B. Hunter, president of the company, stated that about 300 people would be employed.

The Providence Water & Utilities Company, Providence, Ky., is preparing to install equipment for the manufacture of ice.

The American Metallic Packing Company, Lexington, Ky., is in the market for a 6 x 4 x 6-in. duplex steam pump.

G. H. Greenup, Elizabethtown, Ky., is planning the establishment of an electric light plant at West Point, Ky.

H. J. Herron, Middlesboro, Ky., plans the equipment of an automobile garage and repair shop.

The Shelby County Oil Mill, 450 North Bellevue boulevard, Memphis, Tenn., will build a plant, three stories, of brick and concrete, to cost $100,000. A hoisting crane, power and crushing machinery will be installed. Edward Tilden, Chicago, is president.

The Dandridge Light & Power Company, Dandridge, Tenn., will install an ice machine.

H. A. Parham, Kendron, Tenn., will establish a five-ton ice factory and cold storage plant.

P. F. Fitzgibbons, Chattanooga, Tenn., will establish a sawmill at Beechwood, Ga. The power machinery remains to be purchased.

Dresden, Tenn., has sold bonds for establishing a water and light plant.

Fire in the plant of the Atlas Machine Company, Louisville, Ky., damaged its equipment and stock to the extent of about $9000.

Birmingham

BIRMINGHAM, ALA., March 15, 1915.

The machinery dealers report a gradual betterment, especially in sales to the sawmill interests, which have commenced to purchase engines, boilers and pumps in larger quantities than in several months. This is owing to an increase in the prices of lumber and greater activity at mills in consequence. The machine-tool market is quiet. "Nothing doing," said one of the best-informed men in the district. Compared with this time last year the business level is still low.

The Union Cotton Oil Company, Birmingham, will establish a cotton-seed oil mill at a cost of $100,000. J. G. Whitfield, George A. Blinn and others are stockholders. A site has been purchased.

The Floridin Company, Gadsden, Ala., will rebuild its Fuller's earth plant, recently burned.

The Alabama Power Company, Birmingham, has merged several of the light and power companies of northern Alabama under its name and filed a $5,000,000 mortgage in favor of the United States Mortgage & Trust Company. The company is making and will constantly make additions for the use of its hydroelectric current now generated on the Goosa River by works which are estimated to cost several millions of dollars.

The Continental Power Company, Birmingham, has been incorporated by H. B. Wheelock, D. E. Manasco, R. H. Wood and others with a capital stock of $2000.

W. M. Dremmen, Birmingham, and others, contemplate the building of a plant for the manufacture of barrel staves from pine and hardwood.

The Decatur Car Wheel Company, Birmingham, will invest $200,000 in additions for the building of frogs and switches.

John G. Webb & Sons, Demopolis, Ala., will rebuild their cotton compress, etc., at a cost of $80,000.

The Valdosta Machinery & Supply Company, Valdosta, Ga., has been incorporated with a capital stock of $1000 by D. A. Finley, S. A. Canton and E. E. Quinker to manufacture and repair machinery.

The South Georgia Power Company, Valdosta, Ga., is reported to have plans for the development of power on Withlacoochee River. It was recently incorporated with a capital stock of $2,000,000.

The Reliance Equipment Company, 534 City Bank Building, Mobile, Ala., has been incorporated to carry on a business in railroad equipment, machinery and supplies. It is in line for commissions as agent, and requests manufacturers to forward catalogues. William J. Zimmern, Morris Hess, and Leonard H. Metzger are prominent stockholders.

The flour milling plant and grain elevator of the Lynnville Milling & Elevator Company, Decatur, Ala., were destroyed by fire March 8 with a loss of $50,000. It is stated that the plant will be rebuilt.

The Wilmington Iron Works, Wilmington, N. C., will purchase machine tools for the manufacture of machine bolts, set screws, cap screws, wood screws, and other machine screw products.

The Altamaha Sand & Gravel Company, Atlanta, Ga., recently reported incorporated by J. A. & W. H. Pipe, etc., was incorrect. This company was incorporated by F. L. Sage, J. B. Martin and M. A. Bake.

The Carolina Veneer Company, Biltmore, N. C., whose plant was recently burned with a loss of $100,000, has announced that a new mill will be built, and that none of the old machinery will be used in its equipment. J. E. Kocha, president and manager, is now taking bids on the power and special machinery.

The Waterworks Commission, Winnsboro, S. C., has voted to install a sewerage system and waterworks plant, and to improve the electric lighting plant. Work will start about April 1.

Texas

AUSTIN, TEXAS, March 13, 1915.

An unusually large number of municipal bond issues have been voted in Texas recently, and others are pending for the construction of public utility plants. The machinery and tool trade during the past week was dull, due chiefly to the unfavorable weather conditions that prevailed throughout the state. Manufacturers of machinery report that Texas is in better condition than most other Southern States, probably because of immense purchases of horses and mules on account of the war.

G. E. Richmond, 1407 Congress avenue, Austin, Texas, contractor and engineer, and others, have formed the Oakoal Mfg. Company, Austin, capitalized at $25,000, to manufacture fuel and by-products from city garbage. It has been granted a franchise by the city of Austin, to use its refuse. Some special machinery is being constructed by the company for its use; but it will require the following machines: One 100-hp. locomotive boiler, complete; one 75 to 80-hp. cushion slide valve engine, complete; one two-hammer pulverizing mill, to handle 25 tons in 8 hr.; one brick press, to handle 2500 per hr.; one small rotary pump, to handle tar, with 2-in. suction; one 29-in. x 48-in. steam washer; one baling press; one set of rolls; one dog shear, power-driven, to cut 18 in. x ⅝ in.; can reduction machine; coal-handling and mixing apparatus; pulleys; shafting; hangers; belting; etc.

The City Council, Seguin, will expend $20,000 in improving the waterworks plant.

The plants of the Lordsburg Water, Ice & Electric Company, Lordsburg, N. M., are to be improved and new machinery installed.

Dredging machinery will be required for the construction of a drainage district which is being formed near Robstown. The commissioners' court of Nueces County, Corpus Christi, has charge of the improvement.

The plans of the Dallas Southwestern Traction Company, Dallas, for the construction of an interurban electric railway between Dallas and Brownwood involve the building of a power plant.

J. W. Cooper, Wortham, will build a plant for the manufacture of galvanized iron tanks and other sheet-metal products.

The C. B. Cozart Grain Company, Panhandle, will build a 15,000-bu. wheat elevator.

The Hugo Ice & Light Company, Hugo, Okla., will install a turbine, condenser and other equipment in its plant.

The Nu-Fuel Company, Austin, has been organized to manufacture a patent fuel.

The Ford Ice Cream Company, Galveston, has been organized with a capital stock of $10,000 to manufacture ice cream.

St. Louis

ST. LOUIS, MO., March 15, 1915.

The machine-tool market has not been as good the past week, as previous indications promised. There are those, however, who look upon the situation as temporary, just preceding the spring activities. Such business as is moving continues of the single-tool type. Some slight inquiry for second-hand tools has been found.

A furniture factory, with requirements of wood-working tools, is planned to be established in St. Louis by the Mann Brothers, 250 South street, New York City.

The city of Cameron, Mo., Clarence Staples, clerk, is receiving bids for equipment for its electric system, including a 300-hp. Corliss engine, a 250-kw. generator, etc. Harper & Stiles, Kansas City, Mo., are the engineers.

The city of Kennett, Mo., has granted a franchise to the Kennett Light & Ice Company, Kennett, to supply electric light and power, and manufacture ice.

Marshall, Mo., will expend about $70,000 on an electric light and power plant. The mayor should be addressed.

J. R. Johnson, Springfield, Mo., has plans for the establishment of an ice plant of undetermined capacity at Bethany, Mo.

An ice plant of about 10 tons daily capacity will be installed at Buffalo, Mo., by James A. Bonner.

The Springfield Arctic Ice & Cold Storage Company, Springfield, Mo., has been incorporated with a capital stock of $25,000 by W. R. Colcord, J. H. Sells and H. B. McDaniel.

A plant to cut stone, to cost about $100,000, will be installed at Carthage, Mo., by John Gill & Sons Company, Cleveland, Ohio, contractors for the Missouri State Capitol.

The Bergman Shoe Company, Columbia, Mo., will equip a plant of 1000 pairs daily capacity and is in the market for an engine, boiler and other power equipment. H. W. Bergman is president.

The Slatum Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $100,000 by G. H. Ever, O. H. Swearingen and F. W. Patrick.

The Safety Mfg. Company, Kansas City, Mo., has been incorporated with a capital stock of $10,000 by G. C. Bayne, L. E. Wyne and J. F. Schaefer, and will engage in the manufacture of special devices.

Edwin W. Shields, Kansas City, Mo., will equip a garage, six stories, with 45,000 sq. ft. of floor space and install repair equipment, etc.

The Valley Oil Company, Pine Bluff, Ark., has been incorporated with a capital stock of $83,000 by A. H. D. Perkins and others to succeed the Bluff City Oil Company and will increase the equipment and capacity of the oil mill plant.

A flour mill of about 50 bbl. daily capacity is to be equipped at Gassville, Ark., by Joseph Whenery, Halltown, Mo.

A cold-storage plant and ice-making plant are to be equipped at Hardy, Ark., by Joseph A. Weir, Memphis, Tenn.

The Pine Bluff Lumber & Box Company, of which Edgar Brewster, Clio, Ark., is president, will equip a plant of 30,000 ft. hardwood flooring daily capacity at Pine Bluff. Shooks will also be made.

A stave and heading mill is to be equipped at Blytheville, Ark., by George Booser, Corning, Ark.

A hoop factory is to be installed at Pine Bluff, Ark., by B. R. Waite, Muncie, Ind.

Woodville, Okla., will equip an electric light and power plant. The mayor is in charge of the plans.

The Tulsa Boiler Works Company, Tulsa, Okla., of which C. B. Farquharson is president, succeeding the Tulsa Boiler & Sheet Iron Works, will add a plant for car repair work, etc.

A. E. Stephenson, Enid, Okla., will equip a grain elevator with a capacity of 50,000 bu.

The plant of the Apache Cotton Oil & Mfg. Company, Chickasha, Okla., has been burned with a loss of about $15,000. It will be replaced.

The Uniform Asphalt Distributor Company, Meridian, Miss., has been incorporated with a capital stock of $15,000 by N. V. Hendricks and others to manufacture road-surfacing machinery.

Neely Brothers & Co., Natchez, Miss., will build a grain elevator and are reported in the market for about $25,000 of equipment.

I. F. Smith, Houlka, Miss., is reported in the market for buckets and other dredging equipment.

George Lewis, Homer, La., is reported in the market for steam power equipment, including engines and boilers.

L. M. Dunn, Mineral Wells, Tex., has plans for the equipment of a sawmill near Denton, La. It will be a three-planer plant.

The Rapides Gravel Company, Alexandria, La., of which George K. Forse is general manager, is reported in the market for gravel pumping equipment of 1000 to 1500 cu. yd. daily capacity.

The New York Insecticide Company, New Orleans, La., has been incorporated with a capital stock of $50,000 by Edmond Cabiro, New Orleans, La., and H. Schram, Mt. Vernon, N. Y., and others. It will equip a manufacturing plant.

The Jitney Automobile Company, New Orleans, La., has been incorporated with a capital stock of $200,000 by L. Edward Clark and others, and will equip a large garage and repair plant for handling its motor cars, etc.

The Pacific Coast

SEATTLE, WASH., March 9, 1915.

No great improvement has been noted as yet in the machine-tool trade, but the larger shops of this district are gradually getting a better volume of work, and inquiries for single tools and small groups are a little more numerous. The scarcity of some types of tools also gives the market an appearance of strength, though not due to local causes. General machinery business is making more headway with the approach of spring, and considerable activity is expected in the next few months. A better demand for electric power equipment has been noted and public improvements are proceeding more actively. The placing of contracts for large improvement works, such as the Shell Company's oil storage plant near Portland, and the Columbia River bridge, are encouraging features. Mining development in the mountain district of eastern Washington and Idaho shows a perceptible revival, and considerable machinery is being purchased. Some good sized orders are expected from Alaska. The salmon packers are now outfitting, and completing their purchases of equipment.

The Nez Perce Machine Works, Nez Perce, Idaho, will erect a shop 50 x 110 ft., of concrete construction.

The Beaver Automobile Shop, Gresham, Ore., has about completed a foundry.

The Coast Steel & Machinery Company, Portland, has been incorporated with a capital stock of $75,000, by J. F. Sedgwick, A. E. Johnson and J. H. Gallagher.

The Dion Saw Swage & Machine Works, Seattle, has changed its name to Guarantee Mfg. Company.

The City of Aberdeen, Wash., is taking bids for a turbine pump direct-connected with a 250-hp. motor or steam turbine, or with belt transmission to a crude-oil engine.

It is reported that the Grays Harbor Commercial Company, Cosmopolis, Wash., will install a 500-hp. generator and a number of motors in its sawmill.

According to its superintendent, B. R. Smoot, the Utah-Idaho Sugar Company, Idaho Falls, Idaho, will expend approximately $75,000 during 1915 in improvements and extensions to its plant.

Plans for a cold storage plant, to cost more than $10,000, are now being prepared for Joslin & Urton, owners of the Banner Meat Company, Davenport, Wash.

It is announced that the plant of the Government Standard Power Company will be located at Anacortes, instead of Fir. It is stated that the change is due to exorbitant freight rates.

The Case-Shaffer Furnace Company, Tacoma, Wash., has changed its name to the Case Furnace Company. It plans the erection of a fireproof factory.

The city water commission, Warrenton, Ore., of which E. P. Smiley is Chairman, will receive bids until April 12 for the purchase of $150,000 of bonds. The proceeds will be used in the construction of a city water system.

The Judith Mfg. Company, Lewiston, Mont., has been organized with a capital stock of $50,000. It will erect a plant for the manufacture of grates, dampers, hearths, etc.

The Johnson-Prince Timber Company, Bend, Oregon, will build a sawmill, according to Manager John E. Ryan.

The Lost Creek Cedar Company, Ione, Wash., has purchased the plant of the Arsenau Sawmill Company, Tiger, and will move the plant to Ione, and greatly improve and extend it.

The Boise-Payette Lumber Company, Emmett, Idaho, has completed plans for the construction of a sawmill, planing mill, etc., at Plaza.

Frank Schmitt & Co., Portland, Ore., have purchased a site at Ninth and Taggert streets, on which, a sash and door factory will be located. Plans are now under way.

Permit for a 2½-story furniture factory has been granted to Rattan Furniture Mfg. Company, Seattle, to be located at 2648 Fifteenth avenue, West.

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Western Canada

WINNIPEG, MAN., March 12, 1915.

The industrial situation in western Canada has not improved yet to any noticeable extent; but the outlook seems to be a little more favorable. A fair amount of small lots of machinery for repairs is moving; but it is less active than in previous corresponding periods. Very few contracts for equipments for new plants are reported. Business generally will have to improve considerably and the financial situation become much easier before there will be any great change for the better in industrial circles.

J. C. Boyle, Calgary, Alberta, is negotiating to start a packing plant in that city. English capital is behind the proposition, and good progress is reported in preparations. A site has already been purchased.

A wood distillation plant will be constructed at Cranbrook, B. C., this spring, at a cost of $20,000. The architect is H. S. Moore, Blairmore, Alberta.

A by-law has been passed in Vernon, B. C., to spend $105,000 on the construction of a sewage plant, etc. The city engineers are Cummons & Agnew.

Eastern Canada

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Trade conditions in Canada continue to improve. Bank clearings, while still smaller than a year ago, are not characterized by such sharp declines as previously. Last week the decline was but 10 per cent., compared with 17.6 per cent. the week previous. In view of the few operations in stocks and real estate, it is generally conceded that the bank clearings indicate a fair movement in ordinary merchandise. While the steel trade is still quiet, plants are gradually securing an increasing amount of business. According to the report of the comptroller of railroad statistics, issued March 12, Canada had under construction at the end of the last fiscal year 22,891 miles of railroad in addition to the 30,795 already completed. The capitalization of the railroads increased by $277,000,000 during the year; but the net earnings were $10,582,723 less than in 1913. Since the beginning of the year $66,219,000 of Canadian securities have been sold in New York. This is $12,275,000 more than the total amount floated during 1914.

W. Kennedy & Sons, Owen Sound, Ont., are to install machinery at an estimated cost of $14,000 for the manufacture of shrapnel shells.

The Thorold Pulp Company, Thorold, Ont., will rebuild the mill destroyed by fire some time ago. J. F. Wilson is superintendent.

The Canada Forge Company, Ltd., Welland, Ont., is to build an addition to its plant to cost $12,000.

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Cowie & Moore, 302 First avenue, Ottawa, are to erect a machine shop.

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The Ontario legislature has given Brampton, Ont., authority to guarantee $20,000 of bonds for a factory for Sniders, Ltd.

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The Ingersoll Packing Company, Ltd., Ingersoll, Ont., has been incorporated with capital of $1,000,000 by C. C. L. Wilson, St. Thomas, Ont.; C. H. Sumner and H. C. Wilson, Ingersoll, and Thomas K. Boyd, Chicago.

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Bids were received at the Bureau of Supplies and Accounts, Navy Department, Washington, on March 9, schedule 7919, ordnance, class 61, Newport, for one motor-driven generating bevel gear planer—Gleason Works, $2221; D. Nast Machinery Company, $2299, $2307 and $1496.

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O. Wenderoth, supervising architect, Treasury Department, Washington, will receive bids until 3 p.m., March 29, for coal-handling apparatus for the United States Mint, Philadelphia, Pa.

Sealed proposals will be received by H. R. Stamford, chief of the Bureau of Yards and Docks, Navy Department, Washington, until 11 a.m., March 27, for one 15-ton, four-motor electric traveling crane, for the Navy Yard, Washington.

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The Bethlehem Steel Company has just installed three sets of fan system apparatus for heating and ventilating its new shrapnel shop, fuse building and powder loading building. The shrapnel shop, which is 78 x 280 ft. and 30 ft. high, is equipped with a No. 10 Niagara conoidal fan, with a capacity of 40,000 cu. ft. of air per min., and five four-row sections of return bend heater, with 6500 ft. of pipe. The fuse building, 60 x 200 ft., with two wings 60 x 120 ft., all 20 ft. high, has a No. 11 Niagara conoidal fan, supplying approximately 39,000 cu. ft. of air per min., and six sections of heater, with 8000 ft. of pipe. The powder loading building, 40 x 120 ft., and 18 ft. high, has a No. 5 Niagara conoidal fan, delivering 9000 cu. ft. of air per min., and five sections of heater. All of this apparatus was furnished by the Buffalo Forge Company, Buffalo, N. Y. The galvanized air ducts and their installation were the work of Hersh & Bro., Allentown, Pa. The Bethlehem Steel Company uses the fan system of heating throughout its plant, one of its recent installations being that of the new physical laboratory building, in which a Carrier air washer purifies the air and maintains automatic humidity control. The Buffalo fan is motor driven through a silent chain.

A Matthew Addy Corporation

The Matthew Addy Company, a corporation which will be formed under the laws of Ohio, will succeed this week to the business of Matthew Addy & Co., Cincinnati, which will be continued without interruption. The house of Matthew Addy is the oldest in the pig-iron trade in the Central West. It began business in 1859. Pig iron at that time was a side line and cotton the main staple. After the Civil War cotton was dropped and pig iron and coke became the entire business. Matthew Addy personally "imported" the first Southern iron that was brought into the North. It came from the Eureka furnace at Oxmoor, Ala., now owned by the Tennessee Coal, Iron & Railroad Company. The iron was looked upon with great suspicion and distrust, and for several years was regarded by Northern foundrymen as being distinctly inferior. However, presently they learned how to use it profitably and satisfactorily and the dependence of a considerable proportion of the foundries of the country on Southern iron as a part of their mixture is now well known.

Customs Decisions

ALUMINUM DISKS

In affirming a decision of the Board of General Appraisers, the United States Court of Customs Appeals has decided that aluminum disks are not included in any of the terms "plates, sheets, bars, strips or rods," as used in paragraph 143 of the tariff act of 1913, nor are they aluminum in crude form nor an alloy thereof under the same paragraph. On the contrary, the decision says, the history of this provision of the law, as disclosed by its predecessor paragraphs and the testimony in the case, confirms the court in the belief that it is a more advanced article of manufacture than was intended by Congress to be included within the claimed provision of the act.

The test case just decided by the court stands in the name of Guiterman, Rosenfeld & Co., New York City. The goods were rated for duty as "articles or wares not specially provided for" composed of metal, under paragraph 167 of the present law. The importers went before the General Board with the contention that the disks are properly dutiable at lower rates under the provision in paragraph 143 for "aluminum in plates or sheets." The board overruled the claim, whereupon the protestants took it to the court. The decision of the latter tribunal, affirming the board, reviews the tariff legislation relative to aluminum products.

UNFINISHED SCISSORS BLADES

The status of unfinished scissors blades under the tariff law has been fixed by the Customs Court in the case of Redden & Martin, New York City. The appraiser reported the merchandise to be "unpunched, unfinished scissors, sometimes called scissors forgings, intended to be ground down, punched, and manufactured into finished scissors." The collector accordingly assessed the goods as "unfinished scissors" at 15c. per dozen and 15 per cent. ad valorem when valued at not over 50c. per dozen, and 50c. per dozen and 15 per cent. ad valorem when valued at more than 50c. but not more than $1.75 per dozen, all under the terms of paragraph 152 of the act of 1909. The importers protested against this assessment, denying that the merchandise was unfinished scissors and claiming duty at 30 per cent. as forgings under paragraph 123, or alternately at 45 per cent. as manufactures of metal under paragraph 199. While considerable testimony was placed before the Board of General Appraisers, that tribunal overruled the contention. Judge Martin, affirming the board, says:

"The tariff acts distinguishes in terms between scissors and scissors blades and expressly provides that both shall bear the indicated duty whether they be finished or unfinished as such. There must therefore come a point in the manufacturing process where in the contemplation of the act the articles become scissors or scissors blades in name and character, even though they may not yet be finished and ready for use as such. In the manufacture of the present articles that point has been reached. The numerous and important processes of manufacture through which they must yet pass are essentially finishing processes, such as do not forbid their present classification as unfinished scissors blades."

BEET KNIFE SHARPENERS

The Board of General Appraisers in sustaining a protest by the American Express Company dealing with the classification under the present tariff of beet knife sharpeners known technically as "fraises," lays down principles of tariff construction likely to be applied generally to imported articles similarly used on a diversified class of machines. The express company imported the sharpeners for a number of sugar beet factories in different parts of the country, the sharpeners having been manufactured in Germany and shipped before the European war. The sole function of the articles when set up in fraising machines is to keep sharpened and in efficient working condition the knives or blades of beet-slicing machines used in the manufacture of beet sugar. Duty was levied on the fraises at 20 per cent. under paragraph 167 of the act of 1913 as "metal manufactures." They were claimed to be properly free of duty under that part of paragraph 391 specifying "machinery for use in the manufacture of sugar." The decision holds that the testimony of mechanical engineers whose specialty it is to draw and prepare plans for sugar manufacturing plants is uncontradicted that the fraises are " parts of machinery" and as Congress has seen fit to place within the general category of agricultural implements machinery for use in the manufacture of sugar, and, for tariff purposes at least, such machinery is constructively embraced within that class of implements and must be so treated. The decision dismisses the assistant attorney general's objections to duty exemption by saying that no importance attaches to the suggestion that the fraises could also be sharpened or repaired by hand. In the view of the board, machinery especially adapted for that purpose is now used and it is with such machinery the customs tribunal is dealing. The collector is directed to reliquidate the entries on the basis of free entry.

THE WORD "SHAPES" IN THE TARIFF

In overruling protests by William Larzelere & Co., Philadelphia, the Board of United States General Appraisers has refused to give a general or broad interpretation to the word "shapes" as used in the tariff. This particular case arose under the tariff act of 1909, but the board extends the principle of its decision to the present act. The merchandise in controversy was described by the appraiser as consisting of iron in the form of strips measuring from one inch to an inch and one-quarter in width and about one-sixteenth of an inch in thickness. The invoiced description was to the effect the strips have been galvanized. Duty was assessed at the rate of 45 per cent. under paragraph 199 of the old law, as manufactures of metal, while the importers claimed the goods to be properly classifiable as "shapes" of rolled or hammered iron under paragraph 120. In finding against the importers, the decision says: "Broadly speaking, everything that has physical existence has some form or shape, but it would be ridiculous to construe the term 'shapes' as used in said paragraph in any such broad or comprehensive sense."

THERMIT

The Goldschmidt Thermit Company, New York, was sustained in protests covering merchandise returned by the appraiser as "alloy used in the manufacture of steel." The collector levied duty at 15 per cent. under paragraph 102 of the act of 1913. The importer claimed that the shipments should be admitted to entry at 10 per cent. under paragraph 154 as "metal unwrought." At the hearing, a chemist appearing in behalf of the protestants testified that he had made an analysis of a portion of the merchandise and found it to be manganese metal and not ferro-manganese; that the article is technically known as "thermit"; that it does not in any way enter into the manufacture of steel, but is used only for the purpose of fusing steel in repairing breaks and cracks therein. As the Government was unable to contradict this testimony, the board finds in favor of the firm, the collector being reversed.

MACHINE TOOLS

The board made several decisions in claims alleging machines to be machine tools. J. J. Gavin & Co., New York, imported automatic grinding machines used for grinding boiler sections by the use of emery wheels. Duty was exacted at 20 per cent. under paragraph 167 of the present tariff as metal manufactures. The proof submitted by the importers was that the machines are operated by other than hand power. The board accordingly directed their admittance at 15 per cent. under paragraph 165. Similar action was taken in protests filed by Massee & Co., and the American Express Company, New York, relating respectively, to jewelry chain-making machines and ordinary chain-making machines. The F. William Gertzen Company, New York, entered curb chain machines under the present law. They were claimed to be machine tools, but as the testimony was insufficient the collector's tax of 20 per cent. as metal manufactures stands.

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The Bethlehem Steel Company has just installed three sets of fan system apparatus for heating and ventilating its new shrapnel shop, fuse building and powder loading building. The shrapnel shop, which is 78 x 280 ft. and 30 ft. high, is equipped with a No. 10 Niagara conoidal fan, with a capacity of 40,000 cu. ft. of air per min., and five four-row sections of return bend heater, with 6500 ft. of pipe. The fuse building, 60 x 200 ft., with two wings 60 x 120 ft., all 20 ft. high, has a No. 11 Niagara conoidal fan, supplying approximately 39,000 cu. ft. of air per min., and six sections of heater, with 8000 ft. of pipe. The powder loading building, 40 x 120 ft., and 18 ft. high, has a No. 5 Niagara conoidal fan, delivering 9000 cu. ft. of air per min., and five sections of heater. All of this apparatus was furnished by the Buffalo Forge Company, Buffalo, N. Y. The galvanized air ducts and their installation were the work of Hersh & Bro., Allentown, Pa. The Bethlehem Steel Company uses the fan system of heating throughout its plant, one of its recent installations being that of the new physical laboratory building, in which a Carrier air washer purifies the air and maintains automatic humidity control. The Buffalo fan is motor driven through a silent chain.

A Matthew Addy Corporation

The Matthew Addy Company, a corporation which will be formed under the laws of Ohio, will succeed this week to the business of Matthew Addy & Co., Cincinnati, which will be continued without interruption. The house of Matthew Addy is the oldest in the pig-iron trade in the Central West. It began business in 1859. Pig iron at that time was a side line and cotton the main staple. After the Civil War cotton was dropped and pig iron and coke became the entire business. Matthew Addy personally "imported" the first Southern iron that was brought into the North. It came from the Eureka furnace at Oxmoor, Ala., now owned by the Tennessee Coal, Iron & Railroad Company. The iron was looked upon with great suspicion and distrust, and for several years was regarded by Northern foundrymen as being distinctly inferior. However, presently they learned how to use it profitably and satisfactorily and the dependence of a considerable proportion of the foundries of the country on Southern iron as a part of their mixture is now well known.

Customs Decisions

ALUMINUM DISKS

In affirming a decision of the Board of General Appraisers, the United States Court of Customs Appeals has decided that aluminum disks are not included in any of the terms "plates, sheets, bars, strips or rods," as used in paragraph 143 of the tariff act of 1913, nor are they aluminum in crude form nor an alloy thereof under the same paragraph. On the contrary, the decision says, the history of this provision of the law, as disclosed by its predecessor paragraphs and the testimony in the case, confirms the court in the belief that it is a more advanced article of manufacture than was intended by Congress to be included within the claimed provision of the act.

The test case just decided by the court stands in the name of Guiterman, Rosenfeld & Co., New York City. The goods were rated for duty as "articles or wares not specially provided for" composed of metal, under paragraph 167 of the present law. The importers went before the General Board with the contention that the disks are properly dutiable at lower rates under the provision in paragraph 143 for "aluminum in plates or sheets." The board overruled the claim, whereupon the protestants took it to the court. The decision of the latter tribunal, affirming the board, reviews the tariff legislation relative to aluminum products.

UNFINISHED SCISSORS BLADES

The status of unfinished scissors blades under the tariff law has been fixed by the Customs Court in the case of Redden & Martin, New York City. The appraiser reported the merchandise to be "unpunched, unfinished scissors, sometimes called scissors forgings, intended to be ground down, punched, and manufactured into finished scissors." The collector accordingly assessed the goods as "unfinished scissors" at 15c. per dozen and 15 per cent. ad valorem when valued at not over 50c. per dozen, and 50c. per dozen and 15 per cent. ad valorem when valued at more than 50c. but not more than $1.75 per dozen, all under the terms of paragraph 152 of the act of 1909. The importers protested against this assessment, denying that the merchandise was unfinished scissors and claiming duty at 30 per cent. as forgings under paragraph 123, or alternately at 45 per cent. as manufactures of metal under paragraph 199. While considerable testimony was placed before the Board of General Appraisers, that tribunal overruled the contention. Judge Martin, affirming the board, says:

"The tariff acts distinguishes in terms between scissors and scissors blades and expressly provides that both shall bear the indicated duty whether they be finished or unfinished as such. There must therefore come a point in the manufacturing process where in the contemplation of the act the articles become scissors or scissors blades in name and character, even though they may not yet be finished and ready for use as such. In the manufacture of the present articles that point has been reached. The numerous and important processes of manufacture through which they must yet pass are essentially finishing processes, such as do not forbid their present classification as unfinished scissors blades."

BEET KNIFE SHARPENERS

The Board of General Appraisers in sustaining a protest by the American Express Company dealing with the classification under the present tariff of beet knife sharpeners known technically as "fraises," lays down principles of tariff construction likely to be applied generally to imported articles similarly used on a diversified class of machines. The express company imported the sharpeners for a number of sugar beet factories in different parts of the country, the sharpeners having been manufactured in Germany and shipped before the European war. The sole function of the articles when set up in fraising machines is to keep sharpened and in efficient working condition the knives or blades of beet-slicing machines used in the manufacture of beet sugar. Duty was levied on the fraises at 20 per cent. under paragraph 167 of the act of 1913 as "metal manufactures." They were claimed to be properly free of duty under that part of paragraph 391 specifying "machinery for use in the manufacture of sugar." The decision holds that the testimony of mechanical engineers whose specialty it is to draw and prepare plans for sugar manufacturing plants is uncontradicted that the fraises are " parts of machinery" and as Congress has seen fit to place within the general category of agricultural implements machinery for use in the manufacture of sugar, and, for tariff purposes at least, such machinery is constructively embraced within that class of implements and must be so treated. The decision dismisses the assistant attorney general's objections to duty exemption by saying that no importance attaches to the suggestion that the fraises could also be sharpened or repaired by hand. In the view of the board, machinery especially adapted for that purpose is now used and it is with such machinery the customs tribunal is dealing. The collector is directed to reliquidate the entries on the basis of free entry.

THE WORD "SHAPES" IN THE TARIFF

In overruling protests by William Larzelere & Co., Philadelphia, the Board of United States General Appraisers has refused to give a general or broad interpretation to the word "shapes" as used in the tariff. This particular case arose under the tariff act of 1909, but the board extends the principle of its decision to the present act. The merchandise in controversy was described by the appraiser as consisting of iron in the form of strips measuring from one inch to an inch and one-quarter in width and about one-sixteenth of an inch in thickness. The invoiced description was to the effect the strips have been galvanized. Duty was assessed at the rate of 45 per cent. under paragraph 199 of the old law, as manufactures of metal, while the importers claimed the goods to be properly classifiable as "shapes" of rolled or hammered iron under paragraph 120. In finding against the importers, the decision says: "Broadly speaking, everything that has physical existence has some form or shape, but it would be ridiculous to construe the term 'shapes' as used in said paragraph in any such broad or comprehensive sense."

THERMIT

The Goldschmidt Thermit Company, New York, was sustained in protests covering merchandise returned by the appraiser as "alloy used in the manufacture of steel." The collector levied duty at 15 per cent. under paragraph 102 of the act of 1913. The importer claimed that the shipments should be admitted to entry at 10 per cent. under paragraph 154 as "metal unwrought." At the hearing, a chemist appearing in behalf of the protestants testified that he had made an analysis of a portion of the merchandise and found it to be manganese metal and not ferro-manganese; that the article is technically known as "thermit"; that it does not in any way enter into the manufacture of steel, but is used only for the purpose of fusing steel in repairing breaks and cracks therein. As the Government was unable to contradict this testimony, the board finds in favor of the firm, the collector being reversed.

MACHINE TOOLS

The board made several decisions in claims alleging machines to be machine tools. J. J. Gavin & Co., New York, imported automatic grinding machines used for grinding boiler sections by the use of emery wheels. Duty was exacted at 20 per cent. under paragraph 167 of the present tariff as metal manufactures. The proof submitted by the importers was that the machines are operated by other than hand power. The board accordingly directed their admittance at 15 per cent. under paragraph 165. Similar action was taken in protests filed by Massee & Co., and the American Express Company, New York, relating respectively, to jewelry chain-making machines and ordinary chain-making machines. The F. William Gertzen Company, New York, entered curb chain machines under the present law. They were claimed to be machine tools, but as the testimony was insufficient the collector's tax of 20 per cent. as metal manufactures stands.

Trade Publications

Steam Turbines.—De Laval Steam Turbine Company, Trenton, N. J. Pamphlet. Discusses the steam turbine drive for a rolling mill, with particular reference to the geared steam turbine which was recently installed at the plant of the Carpenter Steel Company for driving an 18-in. three-high roughing mill. Numerous photographs and drawings are given, as well as detailed information relating to the problem which was presented and the way in which it was solved. An illustrated description of this turbine installation appeared in *The Iron Age*, November 26, 1914.

Unloading Chute.—Quick Unloading Car Chute Company, Birmingham, Ala. Pamphlet. Points out by a series of illustrations the advantages of using a car chute for unloading material from cars into wagons. In use two of these chutes are intended to be placed on the sides of the car and these are filled while the wagon is away and are discharged when it returns, there being ample space for driving under.

Pumping Jack and Mine Pump.—Humphreys Mfg. Company, Mansfield, Ohio. Two circulars. One is devoted to a direct-connected motor-driven pump that is designed for use in mines where the total lift and elevation does not exceed 175 ft. A brief description of the pump, supplemented by an engraving and a list of the electrical equipment that can be furnished is included. The other illustrates and describes a pumping jack for use with a gasoline engine, windmill, water wheel or electric motor, and also by hand if installed in conjunction with a windmill. Views of the jack itself and also arranged with a pump are presented, and mention is made of a double-acting pump designed for belt drive.

Electric Hoist and Centrifugal Coal Drier.—Link-Belt Company, Chicago, Ill. Two bulletins. The first, No. 207, mentions the advantage of an electric hoist as a substitute for the slow-speed hand chain block. Illustrations of the hoist are given and attention is directed to the various types in which it is made. The second bulletin, No. 212, describes a centrifugal coal drier, in which washed coal for coking purposes and the smaller sizes of steam coal are dried automatically and continuously by centrifugal force. A number of illustrations of the drier and its several parts are used to supplement the text description. Mention is also made of the fact that it may also be used for removing mechanical moisture from many materials. An illustrated description of this drier appeared in *The Iron Age*, June 25, 1914.

Bolts and Nuts.—Kansas City Bolt & Nut Company, Kansas City, Mo. Catalogue No. 414. Covers a line of round, flat and square bar iron; track, machine and carriage bolts; screws and nuts. Illustrations of the various lines are presented with the exception of the bars and lists of the sizes in which all of these can be furnished are presented. Mention is also made of railroad and structural work forgings, turnbuckles, washers and rivets.

Automobile Turntable.—Canton Foundry & Machine Company, Canton, Ohio. Brochure, entitled "The Auto's Turn." Refers to a turntable for use in public and private garages whereby a car can be turned easily. The construction and installation of the turntable is described at some length with engravings to supplement the text matter, and a number of views of actual installations are included.

Aluminum Bronze.—Titanium Alloy Mfg. Company, Niagara Falls, N. Y. Pamphlet. Relates to a titanium aluminum bronze, which is designed for use in the construction of machinery. The properties of the bronze are tabulated, together with the results of tension, alternating-stress and impact tests.

Drop-Forged Machinists' Tools.—J. H. Williams & Co., 57 Richards street, Brooklyn, N. Y. Catalogue. Concerned with a line of drop-forged machinists' tools that include tool holders for inserted cutters of various kinds and the cutters themselves, tool post fittings, lathe and milling machine dogs, clamps of various styles and caliper gauges. As a rule, a separate page is devoted to each particular line, with illustrations, brief descriptions and a table of the sizes in which they can be supplied. An illustrated description of the improved type of safety lathe dog appeared in *The Iron Age*, November 7, 1912.

Steam Goods.—George B. Limbert & Co., 558 Fulton street, Chicago, Ill. Catalogue C. Size, 5½ x 8 in.; pages, 282. This is the company's 1915 catalogue, describing and illustrating a line of screwed and flanged fittings, pipe bends, power plant mains, general cut pipe work, steam specialties, brass goods, malleable iron fittings, valves for all pressures and purposes and a line of wrought iron and steel pipe. There is practically no text in the catalogue, the pages containing illustrations of the various devices, with tables of dimensions and sizes underneath. A comprehensive alphabetical index and one of figure numbers are included, together with tables of the weights and dimensions of pipe of various sizes and kinds.

Engines and Boilers.—Erie Engine Works, Erie, Pa. Pamphlet. Relates to a line of engines and boilers. For the most part illustrations are employed to tell the story, there being practically no descriptive matter other than the captions of the cuts. The engines are built in portable and stationary styles, and the boilers can be furnished in vertical and horizontal stationary and horizontal portable types.

Service Cut-Outs and Meter Adapters and Testing Plugs.—Metropolitan Engineering Company, Forty-second Street Building, New York. Catalogue sections Nos. 3 and 5. Both of these sections supersede the ones of the same numbers previously issued, and the first deals with a service cut-out box and meter adapter. The box was designed for inclosing the service and meter testing cut-outs, as well as protecting the wiring around the meter by the addition of an adapter, which connects the meter with the cut-out box. Illustrations of the box and tables showing the different types of meters for which it can be supplied are presented, together with a service and testing connection diagram. The other section treats of meter testing plugs, which are provided with wooden handles, so that they can be conveniently inserted in the testing clips of the meter testing cut-outs. Diagrams showing the connections for making the various meter tests are included.

Grinding Machines.—Charles H. Besley & Co., 118 North Clinton Street, Chicago, Ill. Pamphlet. Shows a number of patternmakers' grinding machines, their several parts and the different operations that can be performed on each. In connection with the illustrations of the various machines, brief specifications are given, and a general description of the machines and the attachments common to each are included.

Expansion Bolts.—F. H. Evans, 31 Hewes street, Brooklyn, N. Y. Catalogue No. 10. Contains illustrations of a number of different types of expansion bolts, with a brief statement of the work they are designed to do and the sizes which can be supplied.

Injectors.—Hayden & Derby Mfg. Company, 119 West Fortieth street, New York City. Catalogue D-1. Describes and illustrates a line of injectors and ejectors. After a general description of the single and double tube types of injectors, tables are presented of the different sizes that can be supplied of each type of injector and ejector. Instructions on the remedying of injector troubles are also included.

Elevator Buckets, Swing Hammer Pulverizer and Belt Conveyors.—Jeffrey Mfg. Company, Columbus, Ohio. Three bulletins. The first, No. 143, gives complete information concerning a line of malleable iron and steel elevator buckets. Tables of sizes of the different buckets are presented, together with illustrations of the elevators with which they may be used. The second bulletin, No. 147, illustrates and describes a line of swing hammer pulverizers for reducing limestone, shale, shells, gypsum, coal, coke, ores and many other materials. A number of views of installations and a partial list of the users classified according to the material handled are presented together with information regarding the capacities, speeds, horsepower required, general dimensions, etc. The last bulletin, No. 167, contains illustrations and descriptive matter relating to the wide variety and adaptability of belt conveyer equipment for handling practically all kinds of material.

Stokers.—Kokomo Foundry & Machine Company, Kokomo, Ind. Bulletin K-S-I. Illustrates a steam-operated stoker of the underfeed type equipped with rocking grates and clinker grinders. The illustrations show the stoker assembled both in and out of the furnace as well as a view of it ready to operate.

Baling Truck.—Tempus Reclaiming & Mfg. Company, 441 North Third street, Philadelphia, Pa. Folder. Mentions a baling truck for compressing tangled wire, bushy turnings, light sheet metal, rubber, paper, etc. The press, which is a portable device and is intended to be moved around the plant wherever the work is to be done, was illustrated in *The Iron Age*, November 26, 1914.

Engines.—Standard Scale & Supply Company, 243 Water street, Pittsburgh, Pa. Catalogue No. X-113. Covers a line of internal combustion engines, using gasoline, gas or kerosene as fuel, which are built in sizes ranging from 1 to 500 hp. Illustrations of the engines, which are built in both vertical and horizontal styles, are presented, together with brief descriptions and tables of dimensions. Mention is also made of the equipment that is used in connection with the engine, such as storage batteries, pumping jacks, saws, concrete mixers, etc.

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